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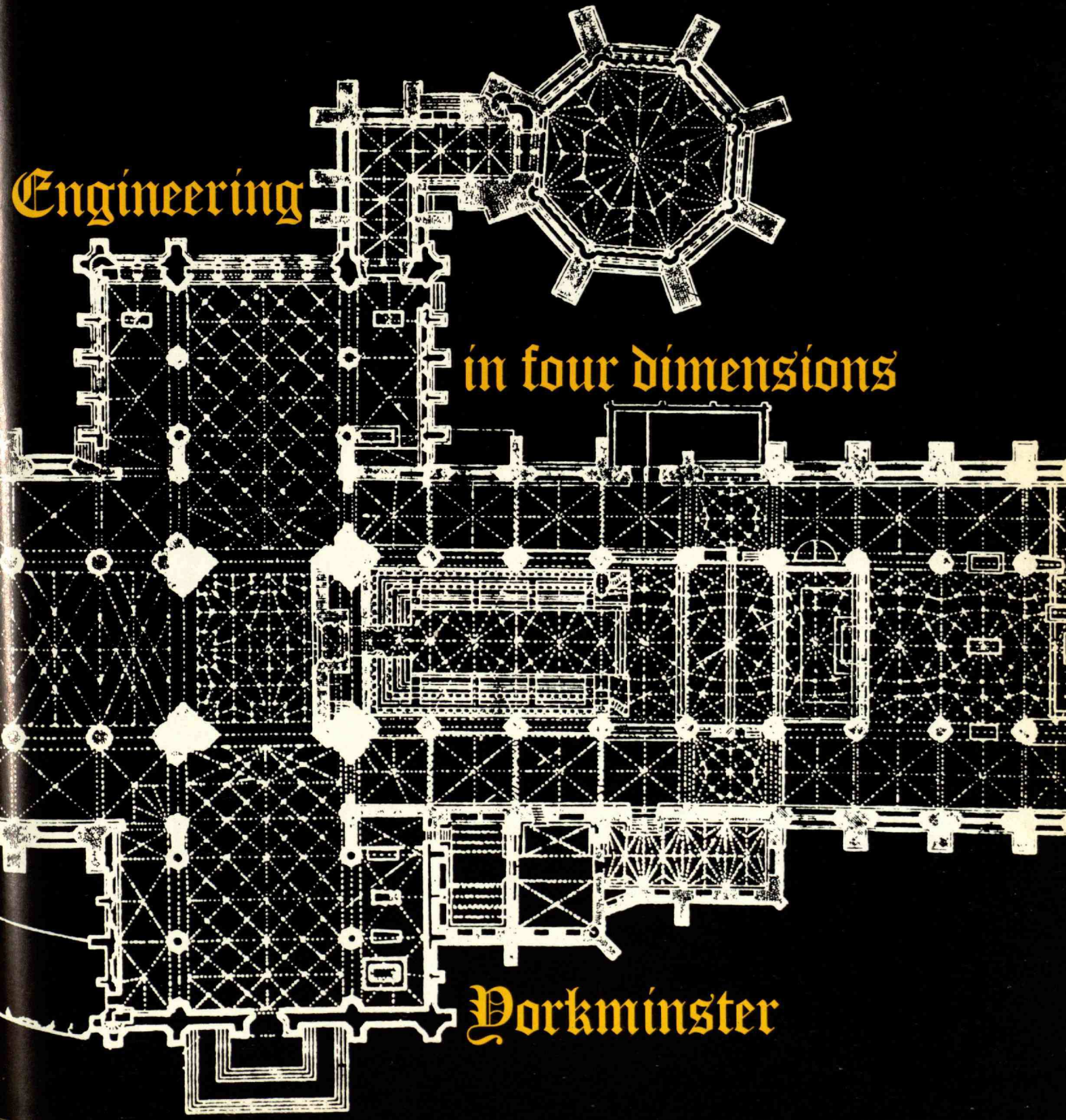
December, 1970. Price, \$1.25

Edward B. Roberts:  
How to Succeed in a New Technology Enterprise

John F. Rockhart: A New Look at Clinical Schedules  
M. S. Kassem and W. B. Wagner: Scientists in Teams



# Technology Review



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## The First Line

As this is written, the issue of campus violence is before the nation more because of a national dialogue about the issue than because of broadly based protest itself. Dialogue and debate—no matter how debased—are clearly to be preferred to the violence which precipitated them, but it is important to note that a good deal of the current dialogue has been either gratuitous or simply ridiculous.

Early in September, following the destructive bombing at the University of Wisconsin, Defense Secretary Melvin R. Laird suggested that campuses were now such dangerous places that defense-sponsored research facilities might be withdrawn from them. Such a statement disregards the many real values which come to the national defense from universities and overemphasizes an issue which—though not to be ignored—simply must be a transient phase of a national, not a campus, problem.

It was less than a week before his Commission on Campus Unrest was to report that President Nixon asked authority for immediate federal intervention in cases of campus bombings, arson, and similar acts—and in cases where there existed information of plots to perform such acts. Editorial Projects for Education noted that the authority—which probably will have been granted by Congress before this is printed—"would be the first time that federal law-enforcement officials stood ready to move onto campuses on their own regardless of the wishes of local authorities." Mr. Nixon's proposal does not in fact provide substantial protection which campuses now lack, and it does not help the American people to understand the circumstances which mitigate so strongly against the use of outside force in most campus disruptions, discussed in this space in May, 1970.

All readers of *Technology Review* are aware of the Administration's response through Vice-President Spiro Agnew to the report of the Commission on Campus Unrest. By contrast with the Commission's report, which is a thoughtful and constructive effort to show the widespread sources of campus discontent

and accordingly to recommend how colleges and citizens alike can respond, the Vice-President has chosen to find in the report an apology and a scapegoat for "the disgusting, permissive attitude of people in command of college campuses."

This editorial would be harder to write—but not less correct—on a campus where unrest or violence had brought major disruption of educational programs. That has not yet happened at M.I.T. The Institute has in fact fulfilled most of the recommendations of the Commission: to define the limits of dissent which are appropriate, to study and strengthen its disciplinary processes, to work effectively with its own and available community security forces, to use internal measures as far as possible when faced with disruptive actions, and to adapt itself to new conditions in the world and to the new concerns of students which are their consequence.

M.I.T. so far has failed to fulfill only one recommendation of the Commission: "Faculty members who engage in or lead disruptive conduct have no place in the university community." Three members of the M.I.T. teaching staff have been under court probation since last spring for their role in the occupation of the offices of the President in January, 1970. While students involved in the same episode have been dealt with under fair academic disciplinary procedures, the teachers involved remain unjudged. Faculty discipline is a faculty problem—and must be, if academic freedom is to be preserved. It is also a faculty responsibility, to be fulfilled deliberately, but decisively.—J.M.

## The Grady Award II

Victor Cohn, who heads the science reporting for *The Washington Post* and who also writes regularly for *Technology Review*, has been chosen to receive the American Chemical Society's 1970 James T. Grady Award for interpreting chemistry for the public. The *Review* basks in this reflected glory—and reminds its readers that the 1969 Grady Award was also given by A.C.S. to a *Review* contributor—Robert C. Cowen.

# Technology Review

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gram will be to develop specific fuel-injection and air-induction equipment with minimum nitrogen oxides emissions characteristics.

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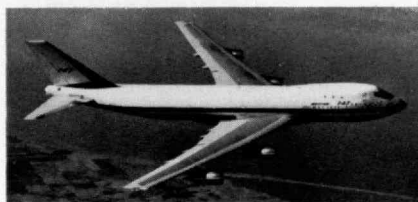
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EPIDAUROS, IZMIR (Smyrna) the BOSPORUS and DARDANELLES. The cruise through the beautiful waters of the Aegean will visit such famous islands as CRETE with the Palace of Knossos; RHODES, noted for its great Crusader castles; the windmills of picturesque MYKONOS; the sacred island of DELOS; and the charming islands of PATMOS and HYDRA. Total cost is \$1299 from New York. Departures in April, May, July, August, September and October, 1971.

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"Scientists concerned with the public's concept of science should forget about the truly irresponsible elements in the press. . . . They should forget about the scare-mongers among their colleagues, too. . . . Instead, they should focus on this very tough problem of how to get their message across when it's so likely to be misunderstood in today's mental climate."

# A Science Writer's Advice to Scientists

One of the character-building disciplines of a science writer is silently to endure lecturing by scientists about the "irresponsibility" of the "sensationalist" press. There's no point in rising in wrath at a scientific meeting to defend what often is indefensible. Like all fields of journalism, science writing has always had its share of the bad along with the good.

But I balk at blaming the press for "needlessly" raising public fears at the stealthy approach of the test-tube baby, the imminent collapse of the ecosystem, or similar bugaboos of the seventies. Damn us all anyway for reporting what respectable experts say!

Joking aside, how do you cover these emotional issues "responsibly" when some of the experts' comments are as sensational as any yellow rag journalist could wish? Though I'm tempted to tell the scientists to look to their own ranks when they cry "sensationalism," the real question is how to put across the moral and social issues of science and technology in correct perspective when many experts seem unaware of the public effect of what they say.

## Cloning and Sensationalism

Consider one of the horror visions of the new biology, the clone people. I first wrote about them several years ago when the prospect was raised during a seminar for science writers put on by the California Institute of Technology.

Cloning in animals is accomplished by using the chromosomes in a cell from some part of an individual's body, say from the skin, to produce a genetic copy of that individual. The chromosomes replace those of a fertilized egg which then matures into the genetic twin. Theoretically, you could run off as many copies as you like.

So far, experimenters have had a limited success with amphibians. The prospect of doing it with man is exceedingly remote, as far as I can tell from talking with a number of knowledgeable biologists. Yet, at that seminar, a distinguished biologist predicted that a crash development program could pull it off in a decade. Some of the science writers attending duly reported the forecast. And

I, for one, later took my knocks from other scientists who criticized such "sensational" stories.

Last summer, the World Council of Churches convened a meeting to consider the moral and social issues raised by science, a conference discussed in this space one month ago. Biologist L. Charles Birch of the University of Sydney urged that careful thought be given to the prospect of cloning. For, he said, "if cloning becomes possible for man, he would have complete control over the genetic identity of offspring."

I asked Professor Birch why he raised the spectre of the clone people when many of his colleagues thought the prospect so remote as to be needless sensation-mongering. He replied that he thinks the prospect sufficiently likely to warrant thinking now about its moral implications. Charges of "sensationalism" should not deter such thought.

A couple of months later, during the annual meeting of the British Association for the Advancement of Science, Dr. D. A. T. New, a Cambridge University embryologist, was again having at press "irresponsibility." He hit at publicizing the possibility of test tube babies. That was, he said, pure science fiction. When asked about the clone people, he said that too is science fiction. It would be irresponsible to play it up.

So I told him about Dr. Birch's comment and asked what press and public are to think. He replied that we should follow the experts' reasoning step by step and see when they depart from scientific fact and wander off into fancy.

He referred to a chart showing the various steps needed to take a mammal, man included, from the stage of fertilized egg to that of birth in a "test tube." A few laboratory animals had been taken through a few scattered steps of the sequence. For man, only the fertilization of the egg and the final step of care for a viable embryo in premature birth have been accomplished. In between these two steps, Dr. New said, is "a colossal blank about which we know absolutely nothing." That is why he calls test tube babies "science fiction." Cloning people

falls in the same category.

What about Dr. New's special concern, though? He and others have had a very limited success in carrying animal embryos through a few development stages artificially. Yet he told the British Association session that the possibility of laboratory cultivation of human embryos is so close at hand that very serious thought must be given to its moral implications right now. Looking at Dr. New's chart and listening to the state of research as described at the meeting, I, as a layman, would judge that he wandered as far from fact into fancy as did Dr. Birch. So, by his own criteria, we should treat his warning as "science fiction" too. Where does that leave us?

Actually, many biologists do see disturbing long-range implications in their work to which they want to alert the rest of us. When their warnings are sharpened and highlighted by press and television, they turn out to be shocking. Whatever reservations the prophet had in his own mind, and may have only partially expressed, disappear from terse news reports. Even when included, readers and viewers tend to ignore them as they concentrate on the disturbing part of the message. So the critics speak of "sensationalism."

## The Uncertainties of the S.S.T.

To take another example, there's the concern about possible climate-changing effects of exhaust from supersonic transports traversing the stratosphere. Dr. B. J. Mason, head of Britain's Meteorological Office, summarized the state of knowledge on that question at a science writers' seminar in London last June. "I can't predict the effect of things like moisture input of the Concorde S.S.T. No, I can't," he said. "Not everyone will tell you that, but I will. . . . Plenty of people on the fringes of meteorology will give you an 'answer.'"

That's all the science of meteorology can say concretely about the S.S.T.'s environmental "threat" at the moment. Yet through theoretical studies, hunches, and just plain caution, a group of American and European experts last summer concluded there is enough presumptive indication of risk to urge governments

to delay using S.S.T.'s until the environmental uncertainty (see *Technology Review* for October/November, p. 58) can be cleared up a little.

In presenting this kind of argument to Congress and the public, many experts and meteorological fringers have implied that flights of the S.S.T. would be in the face of a clearly perceived danger. They have dramatized the risk to make their case.

I asked Dr. Mason where to draw the line. He said he would draw it at the point of not predicting any dire effects, only warning that uncertainties are big enough to urge caution in proceeding with projects that might influence the atmosphere. But one can't, he said, make a hard decision on whether or not to use an S.S.T. on the basis of what meteorology can tell you today.

Personally, he said, "I would be inclined to think the effects of all the man-made things going into the atmosphere are likely to be rather small. That doesn't mean we shouldn't be concerned about them. But we shouldn't go overboard and be alarmist at the other end."

Yet what is one to think when, on the same program, Dr. Mason's colleague H. H. Lamb was openly worrying about Russian plans to divert southward the Arctic-flowing rivers Pechora, Ob, and Yenesei? This might, he said, unfreeze the Arctic Ocean by starving the lens of fresh water in which the ice forms. That, in turn, could have unknown, possibly disastrous, climatic effects—and would at least cause havoc by changing the sea level. There's just the kind of statement that public figures on the fringes of meteorology will take and run with. What they say will be reported. And those reports will, indeed have, sounded rather alarmist, even to me.

#### The Loss of the Qualifiers

Science writers are really over a barrel on this issue of "responsible" versus "sensational" reporting. It's impossible to judge which expert is nearest right. Even if we could, we could only make limited use of that knowledge. We are obliged to report fairly what experts and public figures say.

If Daniel P. Moynihan tours Europe saying we have only a decade to lick pollution or go under, he's going to be reported as a major Nixon adviser. So what if we know he doesn't know what he's talking about on this issue? What he says will register with the public. And all the balancing stories quoting other experts or corrective editorials we write won't wipe out the increment that he has added to public anxiety.

If James Shapiro, Larry Eron, and Jon Beckwith announce isolation of a gene at Harvard Medical School, we're going to report their rather anguished warnings about possible future genetic control of men, too. To cite one quote: "You could phase everybody into the same sort of skin, color, height, personality, making it appear as an aid to humanity. This is a much more subtle way to do things than killing."

Highly sensational stuff. In defense of it, the three scientists later wrote in a letter to *Nature*: "We did not publicize our work in order to add to our own or Harvard's prestige. . . . In a country that makes prodigious use of science and technology to murder Vietnamese and poison the environment, such an enterprise would be at best terribly irrelevant, at worst criminal. . . . In and of itself, our work is morally neutral. . . . But we are working in the United States in the year 1969. The basic control over scientific work and its further development is in the hands of a few people . . . (who) have consistently exploited science for harmful purposes in order to increase their own power."

How is the public to know that these men are motivated by a sick view of America as much as by scientific acumen in making their statement about genetic dangers? It's the fear-provoking statement that sticks. Under the circumstances, how could the press not report it?

Again, we will report Nobel Laureate Joshua Lederberg when he tells Congress, "the grandest predictions made for the fields of molecular biology and biochemical genetics have had a way of being bettered by reality in less than the allotted time." Sure we know he's stretching it a bit to try to press money out of

Congress for research. But the message that gets through to the public is that the horror stories of the new biology, as well as its beneficent visions, will come true much faster than we think. All the qualifications that may accompany the reports will be disbelieved.

Scientists concerned with the public's concept of science should forget about the truly irresponsible elements in the press. They can't reform them anyway. They should forget about the scare-mongers among their colleagues, too. They won't shut them up. Instead, they should focus on this very tough problem of how to get their message across when it's so likely to be misunderstood in today's mental climate.

They will be up against the following trends of public thinking:

1. Science, like magic, can do anything. Statements that test tube babies are unlikely because of the difficulties biologists see will be discounted.
2. If there's a possible evil trend in a piece of scientific work, it will grow. This view is constantly reinforced by the gloom-and-doom school of experts.
3. Qualifications and perspectives with which scientists give responsible assessments of disquieting trends are not shared by the public. The disturbing aspects stand out.

While there's no easy formula for penetrating this communications barrier, it would help if scientists would think twice about the impact of what they say and try to reach public thought where it is. Railing at the press achieves nothing.



Robert C. Cowen, whose comments appear regularly in this space, also serves *Technology Review* as a member of its Editorial Advisory Board. He is *Science Editor* of the *Christian Science Monitor*.



"There is no ecological research program on the scale needed to learn either what is happening to us, or what to do about it. . . . There is . . . yet no national direction on nonreturnables, or on toxic metals, or on offshore drilling for petroleum. . . . There is no national land policy. . . . The list of we-have-nots is almost endless"

## Washington vs. Pollution: Blockbuster or Egg?

Is the Nixon administration—well fed by its business friends—merely dancing a cozy quadrille with pollution? Has this president already missed the chance to strike quickly and massively to clean the environment while the issue is hot?

Indeed, have not the very pattern of the administration attack and its firmest elements come not from the White House but from the Democrats? Senator Henry Jackson's Environmental Protection Act of 1969 created the President's Council on Environmental Quality and its bedrock requirement for environmental planning in every agency. Senator Edmund Muskie's new clean air law (even as it will emerge somewhat changed—as it appears at this writing—from Senate-House conference) plus related legislation now appear to give the government so much power that some local officials are frightened.

The director of the West Virginia Air Pollution Control Commission believes this will make Washington "total dictator in terms of what is done to control air pollution." In fact, says this official of an industrial state not so far noted for its clean air or water: "Through the guise of clean air, the federal government would be exercising more economic control, more plans for your life style, more planning for your property than under any single law enacted in this country." Well, perhaps. Potential power is not real power until it is translated into action by money, manpower, and purpose. The administration's war on pollution has so far been no blockbuster.

But one may also ask: Is this not inevitable this early in this crusade, and indeed wise? Is it not necessary to move slowly, gathering knowledge, creating an Environmental Protection Agency, advancing step by step rather than overpromising and underperforming, and rushing on to disillusionment? This, say administration defenders, is the Nixon strategy, and it is mere kind coincidence that it also keeps the peace with the monied men who help fill Republican coffers.

There is much sense in this strategy, to be sure, whether it was truly forged in high-echelon wisdom or just sprang from

inaction. And there is also much truth in the charge that the administration has so far said more than it has done.

### The Tools Have Yet to Be Forged

It has done some things. It has introduced legislation of its own. This has been largely ignored by the Democrats who have preferred to push their own substitutes, in some cases stronger but in every case designed to give Democrats rather than Republicans credit. So goes the system, and Mr. Nixon will probably use the new Democratic laws in good grace just as he embraced Senator Jackson's environmental quality council after initially opposing it as the Republican presidential candidate.

The administration has created the new Environmental Protection Agency to implement the policies that the Council puts forth. It has added a National Oceanic and Atmospheric Administration, a research arm. How effective E.P.A. and N.O.A.A. will be no one can state. No environmentalist wanted N.O.A.A. placed in the Commerce Department, under a Secretary whose main job is to promote industry, not police it. Can a Commerce-dominated N.O.A.A. fearlessly assess the environmental effects of an S.S.T., for example?

The more independent E.P.A.—responsible only to the president, which means the staff at the White House—may or may not prove to be stronger. That will depend on the president.

### Apollo on the Ground?

It is possible to point to other administration skirmishes with environmental evil. But in total fact, as of late 1970, nearly two years after Mr. Nixon's inauguration, there is still no overall, coordinated administration attack on pollution, and the very tools are still being forged. Yes, it is possible to argue, the administration had to have study commissions (which it partly ignored) to tell it how best to organize E.P.A., N.O.A.A., etc. Still, a few good summer study groups might have produced the same answers faster—faster, perhaps, than the White House wanted them answered.

There is as yet no national energy policy. There is no policy that might

put a stop to urging homeowners and business to switch to all-electric abodes while we face power shortages.

There is no national transportation policy. There is no effort to get man out to the airport faster, or from his home to his job more efficiently, on any scale comparable to the program to get men to the moon.

It does appear that there will be a \$10 billion, 10-year administration program to improve urban mass transit. (see p. 55) It would aim mainly at improving or extending present subway, commuter train, and bus systems. Only \$3.1 billion could be spent in the first five years. Only \$45 million is planned in the program's first year for research or development on new, more novel vehicles or transport modes.

In fact, say critics of the administration's Urban Mass Transportation Administration, U.M.T.A. spent only \$12 million on such research in fiscal 1970, though \$30 million was appropriated. U.M.T.A. Administrator Carlos Villarreal himself recognizes that "in the long run" improving U.S. transportation is "really a \$32 billion program." Even this seems inadequate; only a giant effort, it seems obvious, could reduce the present need to rely on the automobile. Clean engines or dirty, automobiles by the millions are themselves a pollutant.

There is almost no recognition of this problem so far in the administration or Congress. The swift S.S.T. may only increase the pile-ups at the airports. And the administration program to move man faster on the ground is no Project Apollo.

### \$59 Million to Head Off "Disaster"

There is no ecological research program on the scale needed to learn either what is happening to us, or what to do about it. The recent generally excellent—if limited—first annual report of the Council on Environmental Quality said that perhaps the greatest environmental handicap of all is ignorance. "At present no nationwide environmental monitoring system exists," it stated—only fragments. Vast effort is required to learn how to control such vexing pollutants as the sulphur oxides and the nasty heavy

metals like mercury that have just recently eroded their way into our consciousness.

The classic display of science's ignorance is that no one knows whether the environment is being cooled or heated by man's activity, though either could be disastrous. No one knows how much present jet planes are adding to cloud formation. Yet a fine-print table in the Council's report shows that all federal "research, development, and demonstration" outlays are to be increased in fiscal 1971 by only 7 per cent by administration plan, from \$317 to \$339 million. Fiscal 1970 monitoring and surveillance outlays of \$46 million are actually down \$2 million from 1969; they are to be increased in 1971 to \$51 million, up 10 per cent.

These research and monitoring monies are peanuts in the face of the presidents' warning to Congress, as he transmitted this report, that the nation faces "ecological disaster" unless it quickly starts doing more. The Environmental Council may believe we face possible disaster. Some environmentalists and some legislators may believe it. But gut feeling that we are *really* in imminent danger is generally lacking, either in the White House or in Congress, despite the fact that Senator Muskie's National Air Quality Standards Act of 1970 passed the Senate by 73 to 0.

Neither political party, facing 1970 races and the 1972 Grand Prix, wants to be considered anti-environment when the issue is truly dramatized before the public, as Muskie succeeded in selling clean air, mainly by his challenge to the auto industry to produce a cleaner engine "by 1975."

This deadline will almost certainly be bent. The Secretary of Health, Education and Welfare will apparently wind up with authority to grant a one-year extension, and Congress, after all, can grant emergency relief in 1975 or 1976 if the clean engine is not ready. Does anyone really believe Congress will shut down the automobile industry?

The Muskie "deadline" carries teeth nonetheless. It is a signal that the nation has not yet forgotten about pollution, and that, when the public is aroused, polluters may truly face serious economic consequences. A public that has to buy more expensive clean-air cars is not going to trade in so often. A company that produces a better clean-air car may lead in sales to pollution-conscious federal, state, and local governments. One whose engineers falter in this new technology may find it cannot compete in price with clever competition.

The Model-T and mass production made Ford Motor Co. More luxury for all made General Motors. It is possible that a superior clean air car—peppy yet attractive economical, and maintainable—may win a future Great Sales Race?

#### The Endless List of "We-Have-Nots"

Beyond air quality, there remain water and solid wastes. There is not even the glimmer yet of a solid wastes policy. No one has yet come up with a better garbage dump, and the experimental programs are few. A major test of consumer feeling here comes this month (November) in Washington state, where voters are to decide whether or not to outlaw nonreturnables—glass, metal, and plastic beverage containers. A national energy policy maker, incidentally, might ask: Does it make sense at all to make pop and beer containers of aluminum, when refining it consumes vast amounts of electric power? Glass making takes less, while using (unlike metal cans and plastics) neither critical metals nor petroleum nor other chemicals—only sand as the principal raw material.

There is in any case yet no national direction on nonreturnables, or on toxic metals, or on offshore drilling for petroleum. Do we really need to tear up the seabeds? If we had a transit policy, would we really need all the oil? There is no national land policy. Et cetera. This list of we-have-nots is almost endless.

There is no national population policy to consider pollution's most essential raw material: man. It is our breathing, eating, energy burning, and defecating that pollute and will inevitably out-race any antipollution technology if our numbers continue to swell.

There is a \$1 billion Senate-passed "birth control bill" to launch a five-year family planning and population research program. Neither the administration nor the House Democratic leadership has been hard-selling this. Despite pleas for long-term investment in reproductive biology—from Dr. Philip A. Corfman, Head of the National Institute of Health's Center for Population Research, for example—N.I.H. spent just \$17 million on population research in 1970, with just \$11.1 million of it for biomedical study. This may be raised to \$24.9 million for 1971, with \$19.9 million for biomedical research. In the entire world, a Swedish authority reckons, all governments and universities together spend only \$50 million a year on contraceptive research, a third or a fourth, he believes, of the minimum required.

Economists and industrialists still find it hard to conceive of a prosperous society without growth. Some still count on "inevitable" population growth as part of this formula. Yet, writes S. Fred Singer, Deputy Assistant Secretary of Interior (who is generally impressed with this administration's antipollution effort): "There comes a point where a larger population produces no additional benefits. We don't know where this point is, but many people suspect that we have reached it or even passed it."

When will a President of the United States first formally urge his fellow citizens to limit families to two for Z.P.G.?

He would ideally be the head of a presidential family with this magic two-child formula—like the Nixons. Such pronouncements by world political, cultural, and ethical leaders are still rare, and probably acutely needed if we are to develop a new population ethic.

Few population authorities think future society can avoid more tangible controls—something like tax incentives at the least to encourage smaller families—measures at the most that are truly draconian. Unless national population policies are soon enunciated and soon succeed, we may fear future Hitlers who would keep the remnant that is then the earth "habitable" by sending excess, especially undesirable people to their deaths. We have not necessarily seen the final, ecological Auschwitz.



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Pugwash is more than a gentlemen's club of scientists with furrowed brows. The important contributions of Pugwash—and of its individual members—lie in the field of arms control. Here is an account of the positions and their political bases at the 1970 Pugwash conference

# Pugwash: Few Cheers for S.A.L.T.

Elites, even those based on merit, are in disfavor these days. Established definitions of success and authority are eroding under an astonishing wealth of choices conferred by technology and because a higher standard of mass education creates an unusually intense consciousness of the long distance between ideals and the behavior of those who hold power.

It would be too bad if people were thus led to ignore the continuing significance of a small international group of scientists—many of them physicists, quite a few of them from Cambridge, Mass., and some of whom were present at the first test of an atomic bomb—who still nibble at and wrestle with the problem of keeping the nuclear weapons some of them helped develop in their cages, locked away from the most capital danger of all: that some crazed lieutenant or major or general might unleash one or several of the horrific devices and thus open the door to an accidental Armageddon.

Many of this group of scientists assemble at least once a year at meetings of the so-called Pugwash movement, named after the estate of the millionaire Cyrus Eaton in Nova Scotia where they first met in 1957.

Quite a few people think of Pugwash as something faintly ridiculous. For outsiders, there's that name, and then there's the faint aura of political romanticism hanging over the names of Eaton, who never had any subsequent involvement, and Bertrand Russell, who once called for preventive war against Russia but who can be regarded as the founding spirit of Pugwash (he deliberately separated himself from its rather sober conferences when he began the annual series of protest marches to England's nuclear weapons development center).

Even people inside Pugwash wonder a good bit about its relevance and talk about the need for it to find new directions. There is impatience at the slow pace of disarmament and distrust that the two superpowers can ever be made to abandon their invigorating race.

From the beginning, there has been im-

patience to balance the talk about bombs and germs and gases with talk about how to be helpful to people in underdeveloped countries, and, more recently, with talk about the environment.

But the important contributions of Pugwash and of its individual members—who do a great deal of free-lance lobbying at the White House, in the halls of Congress, and at cozy East-West Christmas parties in Moscow—lie in the field of arms control. Those contributions are even more important now that the "nuclear club" has grown larger and the weapons of the two superpowers vastly more sophisticated than in the late 1950's. They become particularly important when negotiations like those of the U.S.-Soviet Strategic Arms Limitation Talks (S.A.L.T.) appear threatened by distrust spilling over from other fields.

## Bringing Reality to the Weaponers

Besides serving as an important mutual listening post for extremely intelligent Americans and Russians who do not have to address each other in the empty language of ideology, Pugwash serves as an orderly forum for continuing reassessment, at a high intellectual level, of the tangled problems of arms control. Time and time again the discussions have served as a neutral platform for working out technicalities—a platform which is free from a politician's fear of losing face at the diplomatic table. Time and time again the discussions have dragged vague, bugbear "horror weapons" out of the closet and exposed them to the pitiless light of physical principle. The disarmament specialists who meet at Pugwash are a pretty effective society for stripping their governments of excuses to hang back on controlling, or even dismantling, the frightful arsenals.

The effectiveness of this group lies not only in the continuing study and talk they must engage in to stay current with the twists and turns of the weaponers, but also in its access to high levels of government. Some of the most active Pugwash participants advise disarmament negotiators directly. Others are at the right hand of the large group of U.S. senators seeking to kill off deployment of an antiballistic missile (A.B.M.) system.

For all these reasons, it is of considerable interest that the international community of scientists pushing for disarmament spent little time at their most recent meeting—in Fontana, Wis., last September—applauding the start of U.S.-Soviet arms limitation talks or rejoicing at the reports from the second round of S.A.L.T. in Vienna between April 16 and August 14.

Reports from S.A.L.T. suggested that America and Russia were converging on a quick "freeze" of long-range bombers and land-based and sea-based missiles at something like the present total of 2,000, along with mutual acceptance of small A.B.M. systems protecting the national command centers of Washington and Moscow. But during their discussions at a lakeside resort hotel, the delegates could not help reflecting how long it took to start the S.A.L.T. talks rolling (more than five years from the original initiatives, more than two from the renewed pleas for them in 1967). During the years that the Americans and Russians talked about having talks, both sides added hugely to their strategic weapons so that they could "bargain from strength."

Many delegates thought the Americans and Russians would have to go much further than a mere "freeze" of present bomber and missile forces to show good faith. And they were hardly encouraged when the Nixon administration began loudly trumpeting its distrust of the Soviet Union after Soviet missiles were placed along the Suez canal in apparent violation of the Middle East cease-fire. Particularly distressing was the breakdown of the barrier, hitherto maintained, between other political questions and S.A.L.T., which had been unaffected by the storm over the Cambodian invasion.

## The Changing A.B.M. Strategy

The apparent difficulty building up for S.A.L.T. can be expected to focus the attention of disarmament-minded scientists more firmly than ever on what lies beyond a quick freeze of strategic delivery vehicles.

As they look ahead, such specialists see a race between A.B.M.'s and in-



creasingly accurate multiple, independently targetable re-entry vehicles (M.I.R.V.'s) leading swiftly to costly but ineffective missile defenses, ever-more-vulnerable land-based missile forces, and a sickening threat of a "launch-on-warning" system of sending one's own missiles off almost as soon as radar blips from the attacker's missiles show up on the war-room screens.

To avoid the cost of A.B.M.'s and the threat of "launch-on-warning," and to start reducing the numbers of weapons, the disarmament specialists find themselves arguing for a "zero A.B.M." agreement linked to total scrapping of the land-based missiles. This implies total reliance on sea-based missiles. To keep the present inviolability of the submarine-borne deterrent, they would add an immediate U.S.-Soviet agreement not to build any big "active sonar" equipment of the sort that would make an entire ocean "ring with sound" to help locate enemy submarines.

This position is much more sweeping than the "zero A.B.M." idea that the U.S. presented to the Soviets at Vienna July 24. That proposal was linked to a specific limitation on the number of Soviet SS-9 missiles, of which about 220 are in place and 80 more are being installed.

As they mulled over the logic of future deterrence, the disarmament specialists were wryly fascinated with the U.S. Air Force's apparent eagerness to commit technological hara-kiri. After all, the Air Force had sought M.I.R.V.'s as an answer to Soviet A.B.M.'s (60 missiles of a crude system have been installed around Moscow). But since installation of M.I.R.V.'s on hundreds of U.S. and Soviet missiles automatically implies the ability to overwhelm A.B.M. systems now contemplated, the development of M.I.R.V.'s implies vulnerability, in as little as five years, of all land-based missiles to a thermonuclear Pearl Harbor. There are a lot of doubts, apparently, about installing the Minutemen on some closely watched trains that would roam around the western plains. An idea of putting the missiles in superhard rock silos has been rejected as vastly too expensive, and the Air force is even having to struggle for \$1 billion worth of equipment for new shock-proof missile-mountings within the present silos (there seems to be plenty of money for M.I.R.V.'s).

From a disarmament man's logic, it would appear that there won't be much of a land-based deterrent left by the time the A.B.M.'s are in place, hard by their super-vulnerable big radars, around 1975. Armed with this logic, and confident that the Nixon administration won't be able again to switch a few crucial votes toward A.B.M. with the argument that it is the crucial "bargaining chip" at S.A.L.T., the specialists intend to fight to cut off A.B.M. again in 1971. They feel such an effort would have more point than ever.

At Fontana, confidence was expressed

that there will be at least 6, possibly as many as 15 senators ready to switch 1969 and 1970 "yes" votes to "no." Such senators only went along this year because of the bargaining-chip argument.

To protect their political flank for the anti-A.B.M. battle, the disarmament scientists were especially concerned about warding off even putative threats against the submarine deterrent, which now constitutes an invulnerable "second-strike" ability to avenge, crushingly and immediately, any nuclear sneak attack.

#### An "Active" Sonar System?

The specialists had a bad moment last June, when, at a Pugwash-sponsored conference at the Racine, Wis., headquarters of the Johnson Foundation, an underwater sound expert named Victor O. Anderson of the Marine Physical Laboratory in San Diego, Calif.—an arm of the Scripps Institution of Oceanography—outlined great improvements in the technology which would be needed to build a so-called active sonar system. Such a system could seek out most if not all of the submarine fleet by cooperating with the existing "passive" sonar network used for such purposes as locating the general area where the nuclear "picket" submarine Scorpion went down in 1968.

In a general review of marine weapons technology at the Racine conference, Anderson spoke of the development of megawatt transducers capable of handling the huge, dense energies needed for making the oceans ring continuously with sound and rapidly improving methods for processing the returning echoes for evidence of where submarines were a few minutes previously.

In theory this information could be used for an all-out attack on an enemy's inventory of submarines, using planes, blimps, surface ships, land-based missiles and "hunter-killer" submarines (today about as numerous as missile-bearing craft).

Anderson's paper at Wingspread, the fanciful name for the Johnson Foundation's headquarters building, aroused a spirited and worried technological rebuttal. "Active" sonars, it was said, would announce themselves at once and could be jammed by other active sonars or fooled by sending subs to areas full of noisy reflections from the sea floor, such as the continental shelves. These conclusions were thought so important that they were spelled out to reporters at a public session in Fontana by Steven Weinberg, Professor of Physics at M.I.T.

Wingspread was also the scene of worried attacks on a paper by David Hoag of the M.I.T. Draper Laboratory indicating that a missile accuracy of around 30 meters from the target (opposed to 400 meters or so today) was achievable by 1980. A big problem in improving accuracy, according to Dr. Weinberg, would be a multi-billion-dollar

effort to measure minor variations in the earth's gravity.

Other weapons possibilities, such as a laser-beam trigger for hydrogen bombs (instead of atomic bombs as at present) or \$100-million atomic grenades using superheavy elements—which would yield the explosive force of a few hundred tons of T.N.T.—were dismissed as either unlikely or useless.

The conclusion conveyed to reporters was that because the active sonars could be fooled, U.S. and Soviet military men might be willing to sign an agreement right now to forego their development, especially since the agreement would be easy to enforce. The equipment for the active sonars would be enormous—both vulnerable and conspicuous—somewhat like the huge very-low-frequency stations the U.S. has dotted around the world to help assure communications with its nuclear submarines even when they are submerged (the subs maintain radio silence).

An agreement to ban the development of active sonars seems to the arms control specialists an attractive way of removing any hint of vulnerability for the submarines or any whisper of an excuse for failure to press ahead with a bonfire of A.B.M.'s and land-based missiles.

To sum up, a highly significant international group of steadily working experts on disarmament, the American members of which may have enough influence with the U.S. Senate to kill off A.B.M. this year, is spending little time cheering about the long-delayed start of U.S.-Soviet strategic arms limitation talks. It regards with stony disbelief assertions that a Soviet lead in explosive power atop rockets confers strategic advantage.

Instead, this group has gone through an intensive review of new weapons concepts on the technological horizon and concluded that there are no nasty surprises which could overturn the strategic balance in the next ten years. Opinion has hardened behind this post-S.A.L.T. disarmament package: scrap all A.B.M.'s and land-based missiles and protect the invulnerability of the "blue water alternative" by agreeing in advance to ban costly, conspicuous, and doubtful developments in antisubmarine warfare.



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The object of the game is to keep busy, keep happy, and be indispensable. But the odds are all wrong, and the game keeps moving on to new tables of players

# Last Pass at the Only Game in Town

The stakes are lopsidedly high. But when pink slips are fluttering about like confetti and engineers do in fact become "a-dime-a-dozen," everyone has to play.

And everyone soon discovers that the rules for this game are a little different. There is the image of the industrious, energetic, productive technocrat to uphold in the face of an empty in-basket. And the idea that scientific manpower is no longer a scarce commodity to be accommodated even while the tuition loan is being repaid.

Following is an account of some of the more bizarre symptoms of players of the game within the Boeing Company in Seattle, Wash., which may in fact be one of the more enlightened of the corporate giants trapped in the Great Aerospace Bubble of the Sixties.

## Keeping Busier and Doing Less

The Law of Inverse Output is the phenomenon of appearing to do more than normal while actually producing far less. It is the first and most visible sign of the company's malaise.

Notwithstanding the tight-lipped, lab-coated flunkies on television commercials, engineers are actually a relaxed, gabby group on the job. If the half-dozen guys gathered around a desk to talk about fail-safe mechanisms sometimes drift into hunting or football, nobody gets upset.

But as the roster begins to dwindle, formality and pettiness dominate the mood of the office. Everyone who is a manager becomes paranoid about paperwork due dates, although they mean less than ever before. Reading trade journals or showing off pictures of the kids are done only in downstairs cubbyholes. A fantastic premium is placed on having tidy desk and lab areas, in spite of the fact that the sloppy guy is probably the only one doing any work. Staff engineers struggle for hours rewording last month's progress report to camouflage the fact that nothing was accomplished. Several people in each group develop the morbid habit of keeping a six-month-old organization chart inside their desks and filling the chart with black X's as their former companions depart.



Tension is amplified when the cutbacks spread to the supportive units. These groups will now create mountains of trivia in order to justify their overblown staffs. The clerks at the supply counter demand a sign-out slip for No. 2 wooden pencils. Every other week the computer people initiate a new survey of non-existent time requirements. Seriously pretending that they know what they are looking at, the photocopy girls inspect every document presented for reproduction.

## The Instant Experts

Diversification of the individual engineer is an admirable goal for any company. The trouble is that at Boeing this is only a last resort. Hence, the development of the foremost of the Instant Experts, the Transferred Tiger. He is a 10- to 20-year man, a former supervisor who has accepted a transfer, and probably a downgrading, rather than look for another job. Although he is highly unskilled in his new field, it is vital to his flagging job security that he immediately assume his former level of competence. So after a staff meeting and a quick glance at the new books, he will begin making technical decisions again. Obviously, the men who have been pushed downward by his arrival aren't exactly thrilled by this, and working relations become even stickier.

Next there is the Scared Super. He has become a little shell-shocked after losing half his group, so he starts trying to do his engineers' work himself; one never knows, you see. He does the day-to-day trouble-shooting, but he is apply-

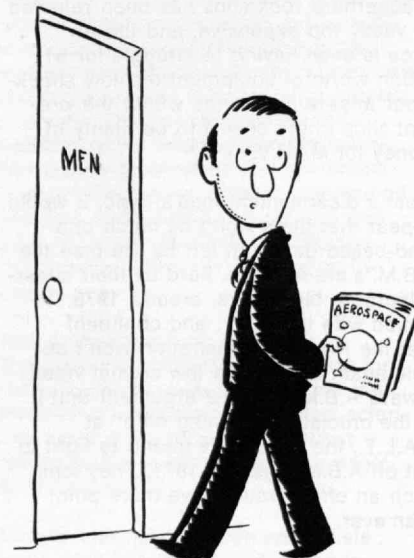
ing 20-year-old methods to problems in a technology that totally renews itself every five years. He, too, loses a few fans among his men.

On the intramural level, there is the Datanapper. He's the type who spends most of his time buzzing about the boss' office. As soon as he finds out what particular project the head man is interested in, he streaks off to the lab or the field where he grabs the latest development and runs back to the boss. The Datanapper is often successful at receiving the credit, because the boss—who is rated on his ability to make swift, sure judgments—is only too eager to cooperate. The hapless engineer out doing the work may be shuffled out the door before he gets to make a final report.

These types of technical slugs are scattered lightly throughout the company, but as layoffs worsen their numbers increase. They are influencing or making critical decisions on sophisticated, expensive hardware. Think about it next time you step aboard a silver bird.

## I Pledge Allegiance to Mount Rainier

The eight hours at the office are only part of the emotional gauntlet. After he



# A Matter of the Mind



gets home, the poor engineer must start reassuring his family, friends, and himself that they are indeed fortunate to be living in the Pacific Northwest. For simply by settling in Seattle, the engineer paints himself into a physical and mental corner.

There is no other place for an aerospace engineer to work within an 800-mile radius. So, rather than fret about being trapped, most people give themselves a ridiculously hard sell on the area. Leaving becomes a grave crisis to be avoided at any costs, including the abandoning of the engineer's training, experience and abilities. Boeing will always be hiring again, sooner or later.

## Redefining the Engineer's Self-Concept

There are several remedies for this type of depressing situation. The easiest, of course, is a massive infusion of money. If the company got back to normal, then all the technical peccadillos described above would be remitted—until the next layoff.

Or else, the company could become a bit more humane. The public relations people always publish the most optimistic employment forecasts, so every time a new one appears the gloom is thickened with wild rumors; and when the employment level is dropped again in a few months, the fears of gloom are fulfilled anew.

Boeing might also make a real effort to turn some of its mountains into high plateaus. Increasing the payroll to over

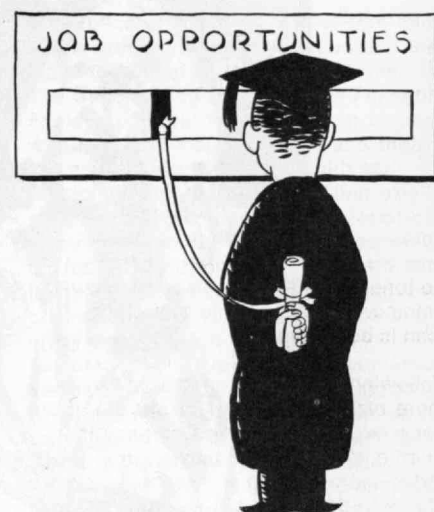
100,000 workers, mostly to fulfill a dubious commitment to produce the 747 within two years of the go-ahead date, is an example of grossly conspicuous consumption.

The only permanent solution, however, is a thorough redefining of the engineer's self concept. Education and experience should not be viewed as the boundary conditions of the engineer's technical worth but rather as necessary steps in the formation of an artisan of applied science.

As it stands, an engineering degree qualifies a young man for possibly 10 per cent of all technical jobs while automatically eliminating him from consideration for the other 90 per cent. This is odd, since all new graduates are equally useless to any company. The idea that any of the problems of today's complex technology can fit squarely within an artificially contrived degree category is obsolete. For the universities and industry to perpetuate these anachronistic barriers between disciplines is a serious waste of resources.

Also, too many engineers are all too ready to subjugate their lives to things. Such an engineer's professional talents and goals are molded by the current popularity of tunnel diodes or polycarbonates. His merit should, however, be based on his resourcefulness, not on the knowledge of transistors that he has hoarded. And if the new breed of engineer, who's enlisting in socially redeeming causes, allows the cause to shape the development of his personal abilities, then he's begging for a spot in the same losing dice game.

As I slipped on my coat on my last day at Boeing, I stood beside a conference room where a new leader was addressing the decimated remains of my old group. The survivors were being told that they were the cream of Boeing's crop and they were the nucleus on which the company would rebuild. What he didn't tell them was that a third of them would be out the door in three months. The game had floated to a new back alley with new players, but the odds were still lopsided.



Mr. Osinski was born in Ohio, raised in Alabama, and received a B.S. degree in engineering science from Florida State University in 1967. He has since—until recently—been employed at the Boeing Company. The illustrations accompanying his essay are by Henry B. Kane.





## Much of the software for the new PDP-8/e is 9000 computers old

It was 1962. John Glenn became the first U.S. astronaut to orbit the earth. *West Side Story* won an Oscar as best picture of the year. Hemlines reached almost to the knee and were still rising.

That's when software for the PDP-8/e was begun.

Two years later, we introduced the world's first minicomputer, the original PDP-8 with teddy bear. Since then, we have created, extended, and polished the software that works on all 9000 PDP-8 family computers—computers that control blast furnaces, monitor nuclear reactors, analyze electrocardiograms, perform all kinds of process and machine control functions. Software for the PDP-8/e really works, and much of it has been working for a long time. On the other hand, much of it is brand new. DIBOL—DIGITAL's new business oriented software. PS-8, the new device independent programming system. And lots more. All together, old and new, there's an awful lot of it.

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# A Matter of the Spirit

## Regaining Pleasure and Delight

### The Feast of Fools: A Theological Essay on Festivity and Fantasy

Harvey Cox  
Cambridge, Mass., Harvard University  
Press, 1969, 198 pp., \$5.95

Reviewed by  
John Crocker, Jr.  
Episcopal Chaplain, M.I.T.

In the March, 1970, issue of "The Browser," the newsletter of the Harvard University Press, it was reported that when a Cambridge lady went to her local library to borrow Harvey Cox's new book, *The Feast of Fools*, the librarian exclaimed, "We have it. It just came in!" She then triumphantly fetched it down from the shelf devoted to cookbooks!

The irony of this little drama is not all that farfetched, for Cox has pulled together for us from here and there an old, and now rediscovered, *recipe* for human life which we all have tasted sometime (too many of us, sadly, not since childhood!) and which we all know, somehow, is important if we are not to lose our humanity entirely, let alone destroy the world.

His thesis, briefly put, is that human beings are by nature creatures who have both an essential capacity and need for "genuine revelry and joyous celebration" (festivity) and an essential "faculty for envisioning radically alternative life situations" to those we now live in (fantasy). These essential capacities for festivity and fantasy, upon which our very humanity depend, have been radically crippled by our hard-nosed, secular, pragmatic, problem-solving, money-oriented culture, by our preoccupation with hard work and with producing and managing an ever-expanding market economy which is engined by faith in technology's ability to solve all problems, even those most thoroughly human. We are thus deprived of our ability to live fully human lives and of the vision necessary to transform our society socially and politically.

The fate described in *Walden Two* or in 1984 would seem inevitably to be ours

were it not for our current and potentially saving rediscovery of festivity and fantasy. Cox rehearses the signs of this rediscovery which are appearing in various segments of our culture, shows their essential interrelationship, and in particular stresses their relation to historic Christian affirmations about God, man, and history as well as to the currents within modern theological thinking.

Lest his humanist and theological essay be misunderstood by those involved in the serious business of scientific research and technological innovation as mere light, subjective frothy stuff related only distantly to the pressing problems of the day, it should be noted that Cox sees festivity and fantasy as essential elements in healthy and radical social change. In fact, he is far more radical than he was in 1964 when he wrote *The Secular City*. "I see more clearly than I did five years ago that the changes we need (in our society) are much more fundamental than I originally thought and that the method for achieving them must be much more drastic."

Far from withdrawing his earlier affirmation of the secular, he sees *The Feast of Fools* as a "companion piece" to the earlier book which contributes to our understanding of the fundamental changes we need in our society and of the methods for achieving them. For he believes there is "an unnecessary gap . . . between the world changers and the life celebrators," between the political radicals and those participating in the life style of the "counter-culture." Very critical of the radical "cop-out" into violence and the hippy "cop-out" into withdrawal from society, he sees "no reason why those who celebrate life cannot also be committed to fundamental social change. The world changers need not be joyless and ascetic." *The Feast of Fools* shows how the two need and complement each other. So his affirmation of fantasy and festivity, of the spirit of comedy and celebration, must be understood as a necessary contribution to, not a withdrawal from, a radical stance towards society and its antihuman values.

Essentially, however, *The Feast of Fools* is a theological essay. To be sure, it is

not biblical theology, which always must begin with divine self-revelation and then move to human experience. No, like *The Secular City* before it, *The Feast of Fools* is pastoral theology which begins with man and his experience and then moves towards the kind of faith and theology which emerge from that experience. Its aim is to sensitize and stimulate us to our own human capacity for festivity and fantasy. It ends affirming laughter as "the voice of faith" and the comic spirit as the source of hope in a crazy world, which seems to deny humanity any future at all. If this method makes Harvey Cox a "Pop theologian" who does his theology backwards, as some would say, his answer would be that it is the only way to do it today. "Experience is . . . a legitimate subject of theological work."

*The Feast of Fools* is a theological essay in another sense. It has a lot to say about what men perceive to be real. Perhaps the best way to illustrate this point is to contrast (very roughly indeed!) ancient and modern views of reality and then to show how *The Feast of Fools* moves beyond both.

In the ancient world men generally believed that what you observed with your senses was mere appearance. The external world was contingent, subject to change and decay. True reality, on the other hand, hidden and distorted by appearances, lay beyond or behind appearances, lay beyond or behind appearances, lay beyond or behind appearances. The people who penetrated through appearances to get at the real were the philosophers, who used their own rational intelligence and creative insight, and the priests, who received knowledge of reality via revelation. Knowledge of what was really real, then, came from philosophy and religion, and the philosopher and priest were the authorities.

By contrast, today the prevailing climate of opinion tends to make empirical science the chief arbiter of reality. And the scientist, however sophisticated and humble he may be about what he knows, becomes the authority. The logic goes something as follows:

1. By the "scientific method" we correlate theory and data by observation and



*When researchers observe themselves, what do they see? One group of them—Scientists and Engineers for Social and Political Action—has the self-image symbolized below. Others have different visions; some very self-critical views are found in the essay here by David J. Rose, whose work at Oak Ridge is very much concerned with the "real" needs of our society.*

experiment, and the reality of theory and data we verify empirically and in practice.

2. This scientific reality is all we can really know about. All other kinds of knowledge are really matters of belief, opinion, attitude, and taste—matters of subjective choice and therefore relative. They cannot be objectively verified. And so no one is in the position of authority with regard to knowledge that the scientist is. Thus, what is not scientific knowledge is not really knowledge at all. It may be opinion or faith, but it is not knowledge.

3. What we can know tends to determine what we believe exists. Although this statement is open to serious question, we would be hard put to deny that it is psychologically so for most people. If you cannot know about something with any practical certainty, then it is at least irrelevant, more probably nonexistent.

4. One important aspect of the modern understanding of knowledge is a little different from that of pure science. It is the technological understanding. Knowledge in a technological age involves "know-how." If we can understand how processes work in such a way as to be able to reproduce them, put them right when they go wrong, use them for our own purposes, and invent new uses for them, then we have knowledge, knowledge of reality, authoritative knowledge. The authority of the medical doctor, of the psychiatrist, and to a lesser degree, I think, the economist, sociologist, etc., share in this technological knowledge. And the authority these men have is verifiable by the results of what they do. Men get well, an economic policy works (or doesn't), what sociology tells us turns out to be true in our experience, and so on.

5. Authority comes from knowledge which can be verified, and knowledge which can be verified is knowledge of what is, of reality. What we can verifiably know, then, tends to determine what is. We have been "cowed into timidity or resignation before mere facts."

Harvey Cox goes beyond both of these

cerebral approaches to reality by exploring deeply and festively the human psyche's instinctive urge for celebration and its inveterate capacity for visions of a new world. He insists that these instincts are essential clues to reality: personal, social, and divine. When these instincts are encouraged and expressed, men become fuller persons, radical social renewal becomes possible, and the living God becomes incarnate among men again.

One final word. The medieval Feast of Fools was an important festival occasion, and men need festivals. It was also an explicitly radical lampooning of society as it was. Because there was no chance or expectation of change, however, it served as a playful and therapeutic escape into fantasy.

Today things are different. There is the same need for celebration. But fantasy is no longer merely play but has become serious possibility. Change can be brought about. Oppressed people know that things do not have to be as they are. Fantasy is now no escape but an essential ingredient of the radical social change we need.

But a changed society will be a hollow gain if we are not changed persons. Harvey Cox has a recipe for both.

### **Mirror, Mirror . . .**

#### **Science Looks At Itself**

Compiled and Edited by  
National Teachers Association  
New York, Charles Scribner's Sons, 1970,  
122 pp., \$5.95

Reviewed by  
David J. Rose  
Director of Long-Range Planning  
Oak Ridge National Laboratory

That our technological skills have brought us to a pretty pass of unlooked-for difficulties, and will bring us worse in the future, there is no denying: cities impacted and increasingly unlivable; disappearing resources; electric brown-outs along with opposition to new power plants—all this and more. Where do you think the heart of the problem lies; hence, from where will the solution come? That



is the gist of this little collection of essays.

My own views on the question have changed with time, as I think that those of some of the authors will change, too. Not that they are wrong—happily I agree pretty much with every one of them—rather, each describes less than the whole problem, as the classic tale has it of the blind men feeling and describing the elephant. Such insufficiency doesn't and shouldn't stop any of us; we are all turning out to be insufficient in this business.

First, it never was just a matter of science looking at itself: the title is inadequate. More nearly it could be technology looking at itself, or more charitably arranged in the service of man; but that isn't enough either. Hear something of what the various authors say. Science (*i.e.*, technology) *can* destroy, says Walter Saunders. Dumping our costs onto society as a whole, as caustic-chlorine plants have spoiled lakes with mercury, just won't do. But is the solution better



technology, better laws and law enforcement, or less avarice, or caring more? In a case I know of, it was the last two.

A principal cause is just too many people for our resources—at least the way we have been living it up—says John Gibbons. We must stop viewing ourselves as masters of all we see. I agree that we are too many, but find few anxious to march into the sea, and universal birth control will require a lot of persuasion. For good or evil, we have the power to be masters; hence *de facto* we are.

Partial emergency fixes are not enough, and the government must give strong leadership, says Charles Stoddard and John Heller. Ten billion dollars over ten years to clean up our water is grossly inadequate, I think. The President's Council on Environmental Quality and the recently established Environmental Protection Agency are partial fixes, concentrating too little (so far) on the forward looking task of keeping us out of trouble in future time. Read the little book *Technology: Processes of Assessment and Choice* (U.S. Government Printing Office) for an eloquent essay on this forward view.

Roy Rappaport shows another part of the picture—how easy it is to destroy something in the act of utilizing it for some simple property, compared with understanding it. That is still closer to the heart of things; our care and wonder for the last tree will substantially exceed that for the first one we cut. Also, he says, man is above all an animal, and must arrange to fit in a fairly natural scheme of things, or else the consequences of overspecialized crops and too simplified food chains will do in him and his system one day. True again, but man the master had better become a much more noble animal to find his way clearly for very long.

Gale McGee, Philip Ritterbush, and LeRoy Augenstein come closer yet—the problem is people, their lack of knowing, lack of caring, lack of communicating, lack of working very hard to see things not just academically from the other person's point of view, but truly from inside the other's mind, looking

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**"There is a surfeit of 'contributions to the solution' made by disciplines, and a tacit assumption that there is a contributtee that puts all the parts together. . . . A contributory principle we must learn is the nonexistence of George."**

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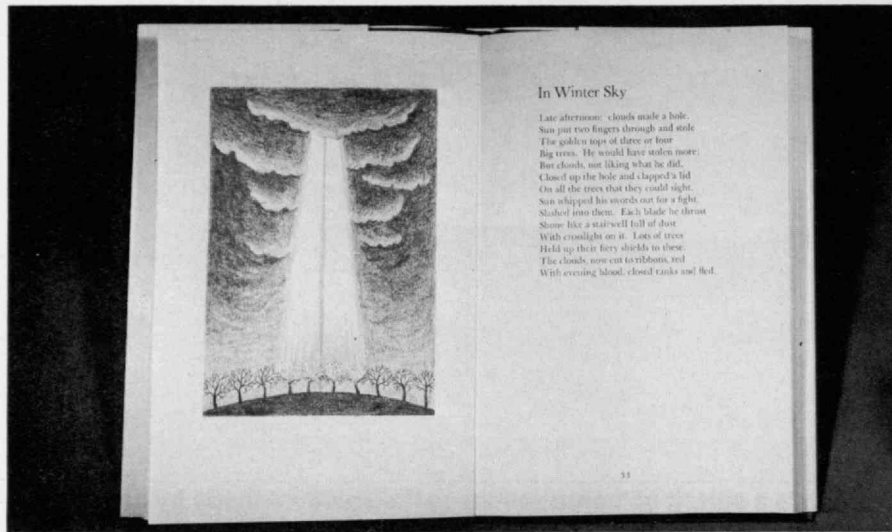
out through his eyes. Then, with Ritterbush, we may see enough parts of the wholeness of things, or with McGee combine constructive methods of science with the communicative skills of consensual politics. Or finally with Augenstein in the essay I liked best of all, face the issue where it chiefly comes to rest—Who shall decide? he asks. We have many choices, none without cost to someone, and some beguile us with short-term profit at the expense of long-term capital loss. Elitism is out as politically unacceptable and leading to a disguised arrogance, of which we have had too much already.

All this brings me to where I think the crunch really comes: it is a matter of the spirit, and whether we really will it in our hearts. There is little difference between allowing our children's inheritance to be chopped down or dug up or poisoned, and allowing facilities to remain all white by intellectual default; or allowing ourselves to exploit a bleeding city by day and retire to a suburban sanctuary by night. I find much evidence that little can be done without and much can or could be done with this kind of commitment of the spirit. On the negative side: The local water resources board in Florida that is composed of real estate developers and which coincidentally recommends cutting development-oriented boat channels from the sea, or the Congressional committees and Executive commissions that project concern on the one hand and stifle discussion on the other; these not only impede progress but also corrode our very mettle. On the more positive side, London's sunshine and England's air have been substantially improved chiefly because people decided that was what they chiefly wanted.

It is not hard to recognize the results of inadequate matching of intent and resources to the scale of problems as they really exist. Respectable disciplinary surrogates (e.g., nuclear engineering) flourish at the expense of the large and

more difficult socio-technological problems (e.g., how best to respond to the country's energy demands). I have heard the Engineering Dean of a prestigious university (not M.I.T.) claim that the traditional engineering disciplines are strong because they have kept themselves pure, and not divisively mixed with sociological values. The Dean was correct, but in a sense that makes him part of the problem, rather than part of the solution. There is a surfeit of "contributions to the solution" made by disciplines, and a tacit assumption that somewhere, somehow, there is a contributtee that puts all the parts together. His name is supposed to be George, whom we have let do it. Another contributory principle we must learn is that of the nonexistence of George.

Many of my natural scientific, engineering, social scientific, and humanistic colleagues find themselves stimulated and exhilarated, not debilitated, by working together on society's problems in more integrated ways. Old wives' warnings that such groups will not "turn out anything real" are false; useful discoveries are made at the synaptic intersection points between disciplines, and we need more of them. The National Science Foundation's I.R.R.P.O.S. Program (Interdisciplinary Research Relevant to the Problems of Society) has \$6 million this year for such experimental work, and it appears to be succeeding like Gangbusters. But it's a long way to go: designing this year's cars took a hundred times as much money, and national defense ten thousand times as much.



## Defoliation, Militarism, and Capitalism

### Defoliation

Thomas Whiteside

Foreword by George Wald

A Ballantine/Friends of the Earth Book (paperback); New York, Ballantine Books, Inc., 168 pp., \$.95

Reviewed by

David Baltimore

Associate Professor of Biology, M.I.T.

Warfare is an ugly aspect of civilization, and the Vietnam war represents a new

level of ugliness. One reason is that the United States has initiated use of herbicides in an effort to counter the challenge posed by a guerilla force which refuses to bend under the weight of more traditional methods of fighting.

We do not know how awful the effects of herbicides have been in Southeast Asia, although a study in progress under the auspices of the American Association for the Advancement of Science is making a start toward finding out. We do know that an area the size of Massachusetts has been defoliated and that half a million acres of crops have been de-

All readers will take pleasure, but Cantabrigians—present or in exile—will take special pleasure, from the collaboration which has resulted in a new book called "For Me To Say" (Boston: Little, Brown and Co., 1970, 100 pp., \$4.50). The collaboration is unique: poet David McCord, Director Emeritus of the Harvard College Fund, and artist Henry B. Kane, Director Emeritus of the M.I.T. Alumni Fund.

stroyed. What military advantage has accrued from this devastation is anybody's guess. The ecological consequences of such massive use of chemicals must be immense and experts predict that recovery of the land will be slow and that some land may never recover.

The most serious effect of the defoliation program may turn out to be a side effect. One of the major chemicals used is called 2,4,5-T (2,4,5-trichlorophenoxyacetic acid). It is an analog of a normal plant hormone, auxin. The analog upsets the balanced growth of plants, causing loss of leaves and young branches and, at high doses, death to many types of plants. It is used as a weed killer in the United States although in much lower concentrations than are used in Southeast Asia. The major danger from this chemical is that either it, its contaminants, or its degradation products can produce serious birth defects in experimental animals.

The initial data indicating the existence of these effects was produced in 1965 by the Bionetics Research Laboratories of Litton Industries under contract from the National Cancer Institute, but it was only in 1969 that the data was made available to the public and then only because it had been discovered by one of Nader's Raiders. Civilians in Vietnam have been exposed to levels of these compounds which caused high levels of birth defects in mice and rats. It seems likely that our defoliation program has seriously increased the number of birth defects in Vietnamese children, but the requisite data to evaluate the effect on these children is not available.

The story of how the Defense Department blindly escalated its use of defoliant and crop killers and then tried to hide the effects from the American people was exposed by Thomas Whiteside in an article in the *New Yorker*. This book is a reprint of this article, along with a series of appendices containing excerpts from relevant reports and statements. The appendices are extremely useful because they allow the reader to judge the case for himself. Whiteside's major contribution is his documentation of the attempted cover-up of the Bionetics report. Some of that report is reprinted in the

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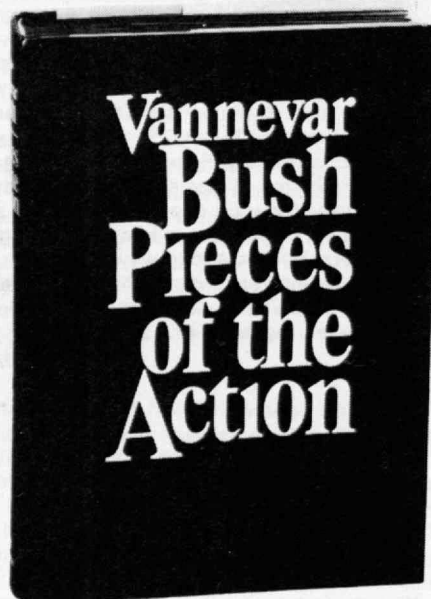
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Frontis. Index. \$8.95





book, and it leaves no doubt about the ability of 2,4,5-T and of other chemicals to cause birth defects.

The book is part of a continuing effort by many Americans to alert the public to the consequences of the United States' refusal to ratify the Geneva Protocol of 1925 which banned the first use in war of "asphyxiating, poisonous or other gases, and all analogous liquids, materials or devices." This prohibition was meant to be general enough to cover nonlethal gases, defoliants, and herbicides (see Philip Noel-Baker's letter in the *New York Times* of December 9, 1969). All of the major powers of the world, including the People's Republic of China, have ratified the treaty. Only the United States has retained the right to use chemical weapons and we have exercised that right extensively in Southeast Asia.

An informal alliance of scientists, politicians, and journalists has been forcing the issue of chemical and biological warfare onto the public consciousness and conscience since the middle of the 1960's. As the horror of lethal chemical and biological weapons became clear to the public, President Nixon on November 25, 1969, renounced their use and severely limited even research on biological weapons. However, nonlethal chemicals (e.g. "tear gas") and herbicides were not covered by the President's statement except insofar as he promised to submit the Geneva Protocol to the Senate for ratification. (The Protocol has not been submitted yet, probably because of the contradiction between its implied ban on nonlethal agents and our use of such agents in the war in Southeast Asia. There has recently been a decrease in our use of chemicals in the war, possibly preparatory to a complete cessation which would open the way for ratification. If we do not stop using chemicals we will either have to let the Protocol languish or ratify with a reservation.)

What the recent revelations about 2,4,5-T have taught us is that lethality is not the only danger from chemicals. To this we must add teratogenicity (production of birth defects) and carcinogenicity (production of cancer). These two effects are harder to measure, especially at low

levels. The framers of the Geneva Protocol had enough prescience to produce a document which did not attempt to second-guess technology. They realized that new chemicals with new effects would inevitably arise and that the ban, to be all-inclusive, must be vague and general. They probably would have been successful had the United States ratified the Protocol, and they may yet force us into dropping chemical weapons from our arsenal.

The outcry against the use of chemicals in Southeast Asia has its parallel at home. These same chemicals, and others with proven or potential teratogenicity and carcinogenicity, are used in manufacturing and, most shockingly, in agriculture. In fact, the battle for the environment and the battle against chemical and biological warfare have much in common. The justification abroad is military advantage; at home it is profitability. Neither military men nor men of business want the public to know about the dangers to which they expose unsuspecting people.

*Defoliation* and the many other books, pamphlets, articles, and speeches which are designed to alert us to some of the dangers inherent in militarism and capitalism are major public services. *Defoliation* is especially good because of its long sections of documentation and its very rapid publication as a paperback. But, no matter how good any book of this sort is, its ultimate value will be decided by those who can translate its warnings into politically effective action.

## Roma Barocca:

*The History of an Architectonic Culture*  
by Paolo Portoghesi  
translated by Barbara Luigia La Penta  
*Roma Barocca* comprises a complete history of building activity in Rome from about 1600 to 1750. But it acquires a far broader interest because of the critical method which it applies to one of the key periods and centers in the history of architecture and urbanism. The discussion includes a broad summary of the urban policies and building programs of the popes as well as an analytic history of the artistic culture of Rome as documented by the theoretical writings and architectural publications of the period. Against this historical background the basic formal principles and compositional methods of the Baroque are verified through critical and technical analyses of the monuments themselves.

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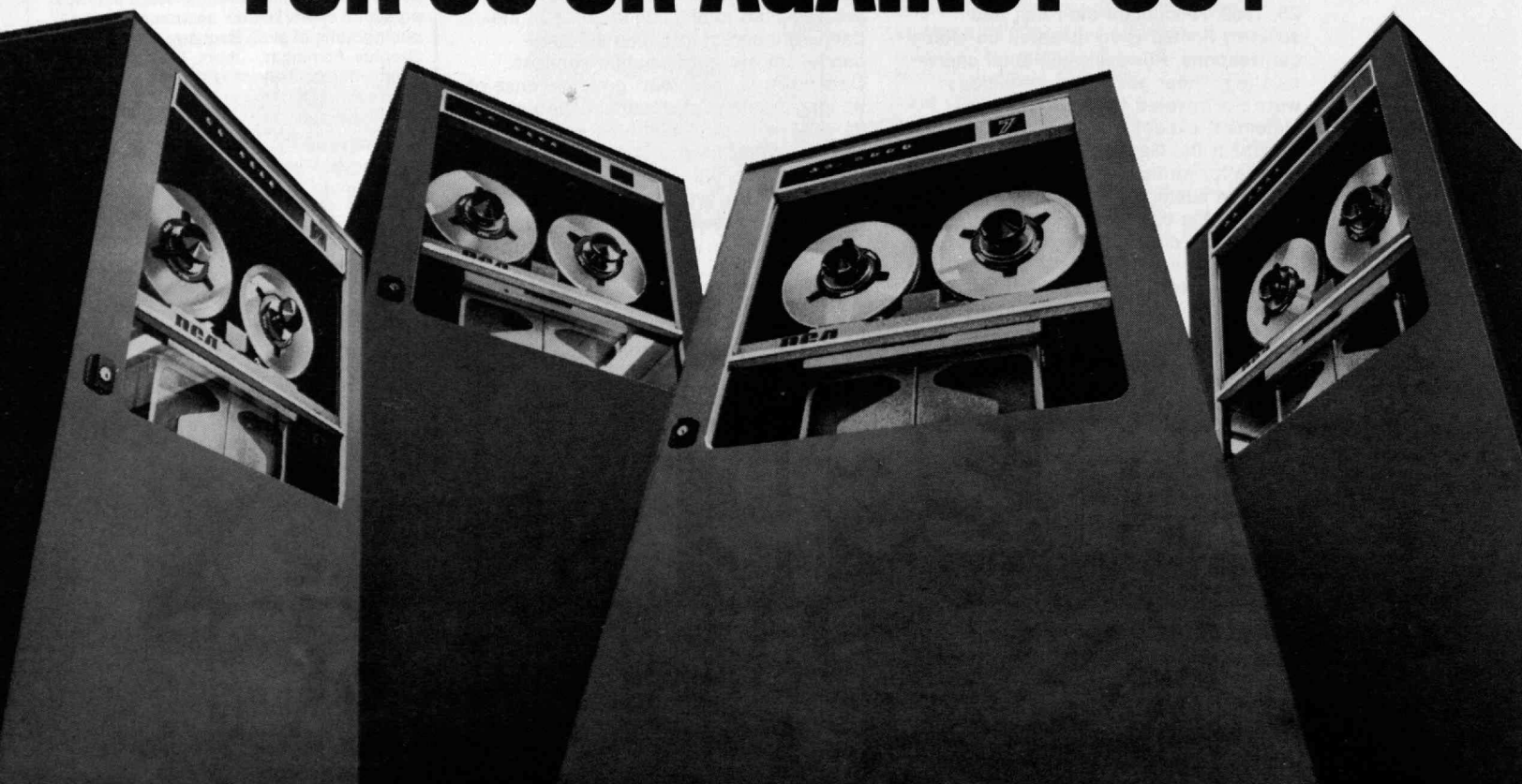
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Route 128, surrounding Boston, is the nation's favorite example of a new-technology community. The "ideal entrepreneur" establishing a new company in such a community "has chances of success in taking a new technology into the marketplace which are better than eight in ten," writes the author.





New companies based on new technology have been founded in record numbers since 1950. Here is a summary of research on the criteria for their success—or failure

Edward B. Roberts  
Professor of Management, M.I.T.

# How to Succeed in a New Technology Enterprise

Today is the age of entrepreneurship. The formation of new companies is increasing—and at a rapid pace; and the average entrepreneur is younger than his entrepreneurial counterparts of a few years ago. What kind of person is today's entrepreneur? What background and talents does he bring to his new enterprise? And what are his chances of success?

This article is based on five years of research conducted at M.I.T.'s Sloan School of Management on the formation and growth of technically based enterprises. In these five years my associates and I have studied about 250 new enterprises; most of them have come out of M.I.T. and its Lincoln and Instrumentation (now Draper) Laboratories, but we have also surveyed new companies founded by people leaving government laboratories and industrial firms. We have examined how these companies have effectively utilized advanced technology; we have studied the backgrounds and psychological characteristics of the entrepreneurs; we have looked into the marketing processes and organizational patterns of the new firms; and we have looked into the decision-making processes of venture capital organizations and how these and other venture capital problems (including the decision to "go public") have affected the success of new technical companies.

In this article I shall review the characteristics of the typical technical entrepreneur as revealed in our studies, some aspects of the process of starting new companies, and—especially—the apparent keys to success and failure of new technically based companies.

Though many of us could anticipate the pattern of growth of the new companies which we studied, their overall success and survivability is something that we did not anticipate.

For example, our first study was of a group of 30 companies that emerged out of the M.I.T. Instrumentation Laboratory. At the time we studied these companies—in 1964 and 1965—the average company was about five years old and was doing slightly over \$1 million of business. That is good performance by any standard; but the more impressive thing is that after five years there were surviving approximately 85 per cent of the companies initially formed. Indeed, approximately 80 per cent of all the 250 technically based enterprises that we

have examined have survived, and now average about five years old. Our figures make it clear that the first several years are the tough ones and that those surviving the first five years are likely to survive thereafter.

Survival is not the same as success, of course, although for many entrepreneurs survival may in fact be sufficient success. We typically define enterprise success in such businessmen's terms as growth, sales, profitability, and the like. But entrepreneurs do not necessarily have those objectives in going into new enterprises; for some, simply producing an organization that has survivability is a sufficient reward—even if it yields no greater income to the entrepreneur than he made in his previous employment.

What about the characteristics of the men who formed these companies? The entrepreneurs are indeed an intriguing lot, and in looking at them we are struck by several key characteristics. To report them is not to say that every entrepreneur must have these characteristics to be successful, but the reader may indeed wish to compare himself and his associates with these prototypes in considering whether starting a new business is going to be his thing.

The first characteristic of the entrepreneurs that we note is one aspect of their family background. In every single one of the samples that we studied, about 50 per cent of the entrepreneurs came from homes in which the father was self-employed. The likely rationale may be put this way: if your father was in business for himself, you have probably been exposed to a background of business conversations in the home as part of your growing up; you tend more, whether you realize it or not, to think in business terms; you identify with the vocabulary and concepts of entrepreneurship—employees, suppliers, pricing, profit, cash flow. This is not to say that such a background is essential; but we think that this kind of entrepreneurial heritage is an important force that tends to push people toward starting new businesses.

Our evidence suggests that would-be entrepreneurs would do well to ask themselves: Do you really have a long-term familiarity with business-type considerations? Are you acclimated to the type of thinking and life that's associated with running your own business? Is it a way of life and kind of responsibility you will enjoy?

If you come from a home in which the father was in business for himself, you probably have a better understanding of whether this kind of life is for you.

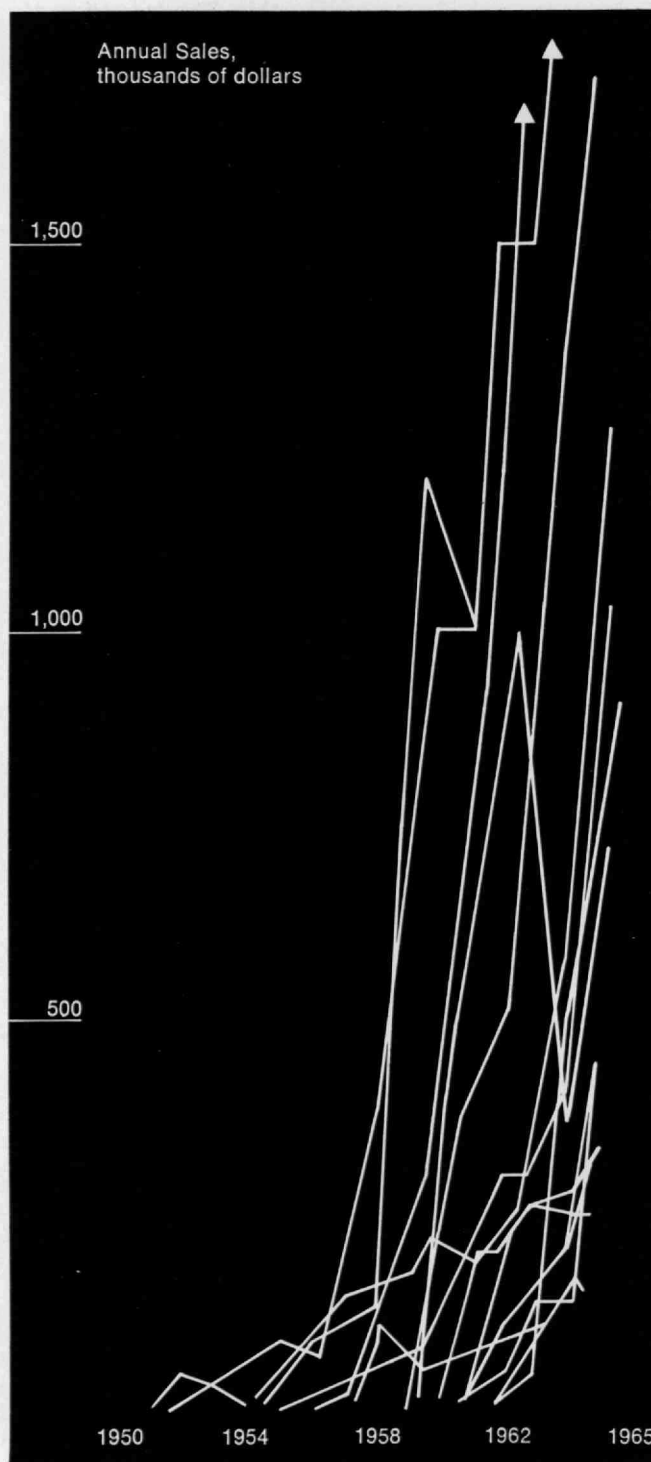
The second notable aspect of the entrepreneurs is age: the average entrepreneur coming from an M.I.T. laboratory was 31 or 32 at the time of starting his company. (But it is important to note that these data pertain to companies formed typically in 1961 or 1962. I am convinced by observing the current scene that the age of entrepreneurship is indeed trending further downward, and this trend is probably going to continue.) In fact, very few entrepreneurs are over 40 at the time of company initiation. The relative youth of the entrepreneur seems significant in two ways.

The older a person is, the greater his commitments to present patterns of activities—family, organization, outside activities, community—and the greater the difficulties of breaking those patterns. Not only are there psychological difficulties; there are in fact likely to be meaningful entanglements and relationships with others. Breaking these associations may pose costs very much greater than any possible reward. There are exceptions to the general pattern of youth: for example, two companies we studied were formed by M.I.T. professors who had reached the age of 65 and were put on retirement status; both companies were successful.

The point to be made in writing about these two exceptions at age 65 is not simply to say that some few entrepreneurs were not young, but rather to argue the second characteristic of youth: the real requirement is vigor and energy. To start a company and put it under way requires on the part of the entrepreneur a tremendous amount of energy, and he must put forth an immense amount of effort. These abilities are usually characteristic of younger people—but not always. When we speak of the typical youth of entrepreneurs, what we really interpret our data as saying is that successful entrepreneurs are people who are willing to break out of the entanglements of their present situations. They are able to commit in generous amounts their time, effort, and energy to the starting of a new enterprise. (That commitment of time, effort, and energy will almost surely be at the expense of many other activities, including particularly the entrepreneur's family; indeed, this competition with family for energy, attention, and devotion to a new organization is one of the problems that arises in many new firms. The new enterprise can become a taxing mistress.)

A third characteristic of the entrepreneur is his education. Our study included only entrepreneurs who left advanced technology organizations, so technical education itself is expected. But it is significant that the typical entrepreneur that we examined had a master's degree—usually in engineering, sometimes in science, sometimes in other fields—and had in fact gone somewhat beyond the master's degree by taking several additional courses. We had entrepreneurs with doctorates in our sample, and we had others with only bachelor's degrees and even some without collegiate degrees. But the master's seemed to be the most specific symbol of participation in advanced and advancing technologies.

*This chart records the growth rates from 1951 to 1964 of 30 companies formed by entrepreneurs formerly employed at the M.I.T. Instrumentation Laboratory. The first company formed did indeed fulfill the mythology of the garage-type enterprise established by an engineer with a great idea. The company had been based upon some very sophisticated work but the founder was unable to carry it off successfully. Despite this initial failure, the pattern of Instrumentation Laboratory spin-offs shown below is a pattern of success—of exponentially rising sales and profitability during the first five years of life.*



The entrepreneur was not necessarily a technical genius; he was not necessarily the inventive mind behind the company; he was not necessarily the man who came up with the brilliant technical advances himself. But our studies suggest that if the basis of the company is technical—if the new enterprise is working at the forefront of a technology—then its founder probably should have sufficient background through education and experience to participate actively in that technology, to understand the work and contributions of others in that technology, and to put developments in the market place in their proper context in relation to the advancing technology. The master's degree simply represents an appropriate degree of understanding and background.

A fourth characteristic of the entrepreneur is suggested by our finding that entrepreneurs usually have come out of development rather than research activity. This is important in terms of which people are suited for entrepreneurship and which type makes effective entrepreneurs. The development process, in contrast to research, involves translating ideas and skills into some form of utilization—hardware, production, whatever the actual specific objective. In contrast, research is a process of the creation or enlargement of knowledge. Entrepreneurship is in fact more akin to development—to applying skills and knowledge to create something that is real and is clearly useful. The man who has been working in development activities has already come closer to the things expected of him as an entrepreneur than has the man on the research side of the organization. So a development background is not only a correlate of entrepreneurship; it is also a statement of experience applicable in an entrepreneur undertaking.

What about the companies formed by the entrepreneurs whose achievements we have studied? Remember that our data are for companies formed typically about 1962; to the extent that readers believe 1970 is different from 1962 or 1963, they may argue that new phenomena and changed circumstances render our data obsolete. But we suspect that the obvious changes—the tighter money market, the recent reductions in government contracts, new technologies not available ten years ago—are superficial, that most of our basic findings are as valid for companies formed today as for companies organized eight years ago.

Among our findings on new firms is that the one-man entrepreneur is an interesting idea, but that most companies are formed by two or more people. The one-man entrepreneur succeeds less frequently than the multi-man organization. There are several reasons: the single-man entrepreneur—partly because he is alone and partly because of the very orientation that makes him go it alone—tends to form a very different kind of company than the multi-man entrepreneurial group. The one-man company is a research-oriented firm through which the entrepreneur himself can do his "thing"—the work at which he was expert in his previous employment. His opportunities are limited; he must be his own marketing man; he must be his own critic; he must supervise his technical work; he must organize his own financial and personal management.

He can run such an organization out of his back pocket or out of his garage or his living room.

The larger the group of entrepreneurs, the greater the likelihood that this group will utilize themselves in a way demanding multiple contributors and multiple skills. For example, the greater the number of founders, the greater the likelihood that the new company will be devoted to manufacturing or repetitive services—especially, today, computer services. When several entrepreneurs get together to form a firm, they usually feel that their complementary skills and backgrounds permit each to take a relatively different role in the new enterprise—production, product development, control and operations, or marketing. The research company needs few relatively different roles.

The kind of enterprise that is planned affects not only the number of entrepreneurs required; it also influences the amount of capital needed and the sources from which it may come. One of our findings has surprised many people in the venture capital field: the typical company started with very little capital. The typical total was \$5,000 to \$8,000, and it was usually contributed by the entrepreneurs themselves, their families, and friends. Formal sources of venture capital were seldom tapped, at least in the initial stages.

But our study also suggests that the larger the amount of initial capitalization and the larger the number of initial founders, the greater the likelihood of the company's later success. Hence this advice to would-be entrepreneurs: if you feel that you cannot start a business because you do not yet have that multi-hundred-thousand-dollar kitty that you think you need, better reconsider your motives and reexamine your convictions. If you really have strong entrepreneurial motives and strong convictions that you are going to succeed, there's a very good likelihood that you can in fact make a start with what you personally have available and what you can raise from family and friends. (The figures cited pertain to companies started generally in 1962 and 1963. A large number of new entrepreneurs today seem to feel that to start a company off properly now they need several hundred thousand dollars. This may be one of the requirements that has in fact changed in the past decade.)

Most of the companies we studied began with an orientation towards government contracting and the expectation of major sales to the military. But after about five years of existence, the typical company had moved away from absolute dependence upon government contracting and was doing 40 per cent of its business in wholly commercially oriented areas. Today's reduced expectations from the federal government and the growing applications of computer technology may have changed this situation, so that many more new companies are now more oriented toward commercial, industrial, and consumer markets.

The companies we studied achieved a tremendous amount of what we call technology transfer—their entrepreneurs took advanced technology out of the organization where they had been employed and moved



it into the market. Some—the largest single number—did so immediately by forming their companies at once. But most entrepreneurs first went to industry; they did so often fully convinced that they would soon leave and set up their own businesses, but they felt that they first needed practical experience—as controllers, in marketing, in project management—which they expected to gain in industry.

But those who delayed their entrepreneurship paid a heavy price for this experience: they took far less of the technology available from their original laboratories into their companies. The entrepreneurs who started their new companies immediately upon leaving the advanced technology laboratories tended to utilize and exploit laboratory technology to the greatest extent in their new enterprises. Men who delayed sometimes forgot certain aspects of the new technology; it was less relevant because the market had moved on; the demand was less keen because the once-novel technology was no longer a novelty. It is clear that the longer the entrepreneurs delayed forming their companies after leaving an advanced technology center, the less they actually took advantage of the special technological knowledge and skills that were in these laboratory organizations.

What factors led to success or failure for the new companies we investigated? What things make the difference between high and low performance when performance is measured in terms of sales growth, profitability, and persistence?

The first factor we list is a high degree of technology transfer. Those companies that were founded on the basis of rapid and direct translation of advanced technology from the parent laboratory to the new enterprise were the ones most likely to succeed. Companies formed by entrepreneurs who sought business experience that they thought relevant and critical to company success exploited technology to a lesser extent and were less successful as business organizations. Success for a new technologically based company depends on moving quickly into the marketplace with a level of technology that is not there.

Unique technical ideas are the one strongest competitive advantage that a fledgling company has potentially available to it. If the entrepreneurs lose this advantage while trying to gain business experience so they can compete on the basis of business acumen, they lose. If they try to compete on the basis of marketing experience, they lose. Indeed, if they try to compete with established industries on the basis of any one of the skills in which the established industries are experienced, they are probably going to lose. The most successful of the companies that we studied were those that most immediately and most directly put advanced technology to use.

Moderate educational level seems to correlate with business success, in the sense that the lower performers among entrepreneurs were typically Ph.D.'s. This is not to say that the additional education was damaging; it is rather to suggest that the personal characteristics

of the man who is willing to go through the process of getting a Ph.D. are different from the characteristics of a man most likely to be a successful entrepreneur. A Ph.D. program involves—in addition to advanced study and research—a fair amount of regimentation, regulation, committees, writing, and the like. The man who has the Ph.D. probably has a very different set of motivations from the man who wants to get with it, to start putting ideas to work and make something happen. (It is also true that I know several very successful Ph.D. entrepreneurs. So we are not saying that if you have a Ph.D., give up. We are saying instead that if you have a Ph.D. you should think your motivations through more carefully, ask yourself if you are really willing to sacrifice the time, energy, and other commitments to try to create a driving, successful organization.)

Our research suggests that the successful entrepreneur does not require explicit managerial training or experience—a finding which totally disagrees with the views of most venture capitalists. What is needed to be a successful technically based entrepreneur are not necessarily training and experience—but a managerial point of view, a set of attitudes that are clearly managerial in substance.

These attitudes appeared in our research findings in at least three ways. The successful technical entrepreneurs were those who perceived the need to bring into the company people with business skills and business experience. They respected the problems of management, control, and administration and accepted the need to bring specialized capabilities to bear on the business functions of the organizations. Similarly, the successful companies had a formal marketing department. One of the unfortunate things we were taught implicitly as undergraduates is an arrogance of technology that leads some entrepreneurs to believe that the market will beat a path to the door of anyone with a unique and important technical idea. That notion is as wrong as can be. Even the great technical idea needs to be sold energetically and effectively to be the basis for a successful new firm.

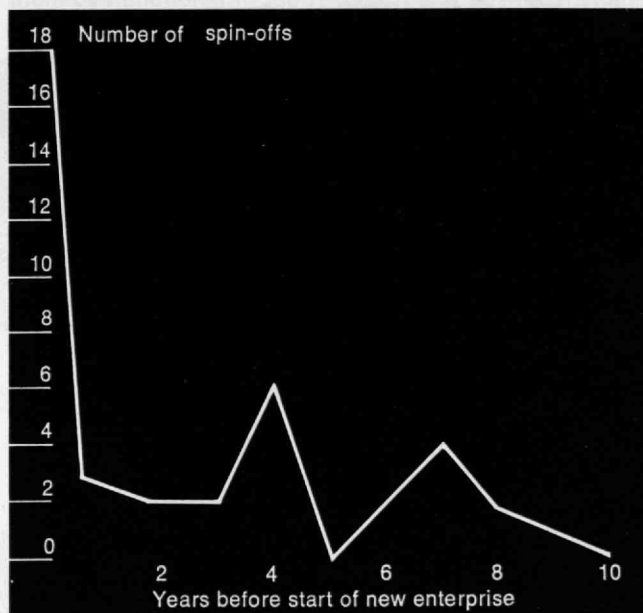
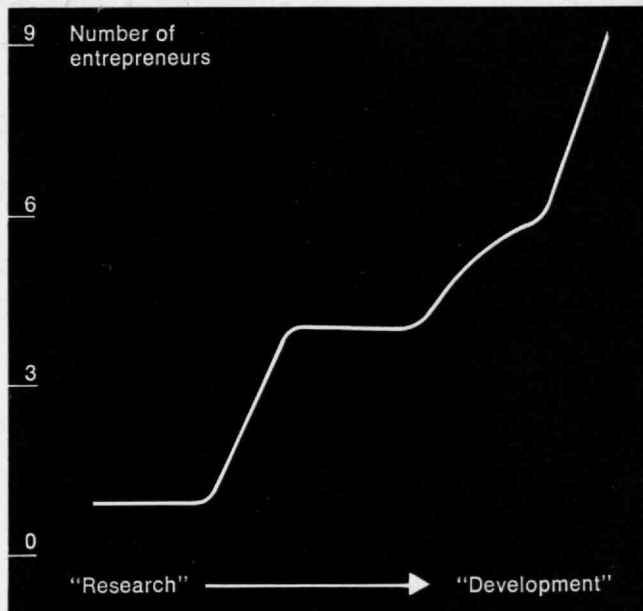
Finally, the founders of successful companies indicate greater concern for personnel matters in their organizations. They were oriented to providing challenge and satisfaction for their employees as well as themselves.

Thus the effective technical entrepreneur is perhaps surprisingly lacking in management expertise, but he is well equipped with balanced managerial attitudes and perspectives. He appreciates the need for acquiring relevant skills to solve company problems—whether these be administrative, marketing, or other personnel resources. He places a balanced emphasis on integrating these several functions into the technological base he has brought to the new firm.

Further to confirm these impressions, we have made a series of psychological studies of 50 entrepreneurs who founded their own technical companies. Though even we retain many reservations about the reliability of these psychological tests, one characteristic showed up

The previous assignments of 39 entrepreneurs who "spun off" from one large electronic systems company studied by the M.I.T. entrepreneurship project are shown on a frequency plot with a scale going from basic research to the most applied development activity. The largest number of entrepreneurs—not just out of this organization but out of all the organizations studied—came from developmental activities.

The largest single number of companies which spun off from M.I.T.'s Lincoln Laboratory were established immediately after their founders left the Laboratory. But the median company was not formed until 2½ years after its entrepreneurs had left the Lincoln staff. In the meantime, the company founders usually worked in industry, often for the explicit purpose of gaining what they felt was relevant and important business experience that they felt would help them set up their new company.



quite convincingly: entrepreneurs who are successful have a very high need for achievement. In psychological terms, need for achievement describes a person who seeks to fulfill three conditions in any situation: he seeks moderate risk—not high risk and not low risk—so that the probability of failure is neither so high that he is unlikely to encounter success or so low that there is no challenge. He looks for a situation that offers tangible measures of success. These measures can be in financial terms or—more likely—they can be in terms of a viable, sustained, growing organization: products selling in clear-cut markets, good technical and market reputations, steady growth with reasonable financial return. And he looks for a situation where he himself can be the primary cause of success.

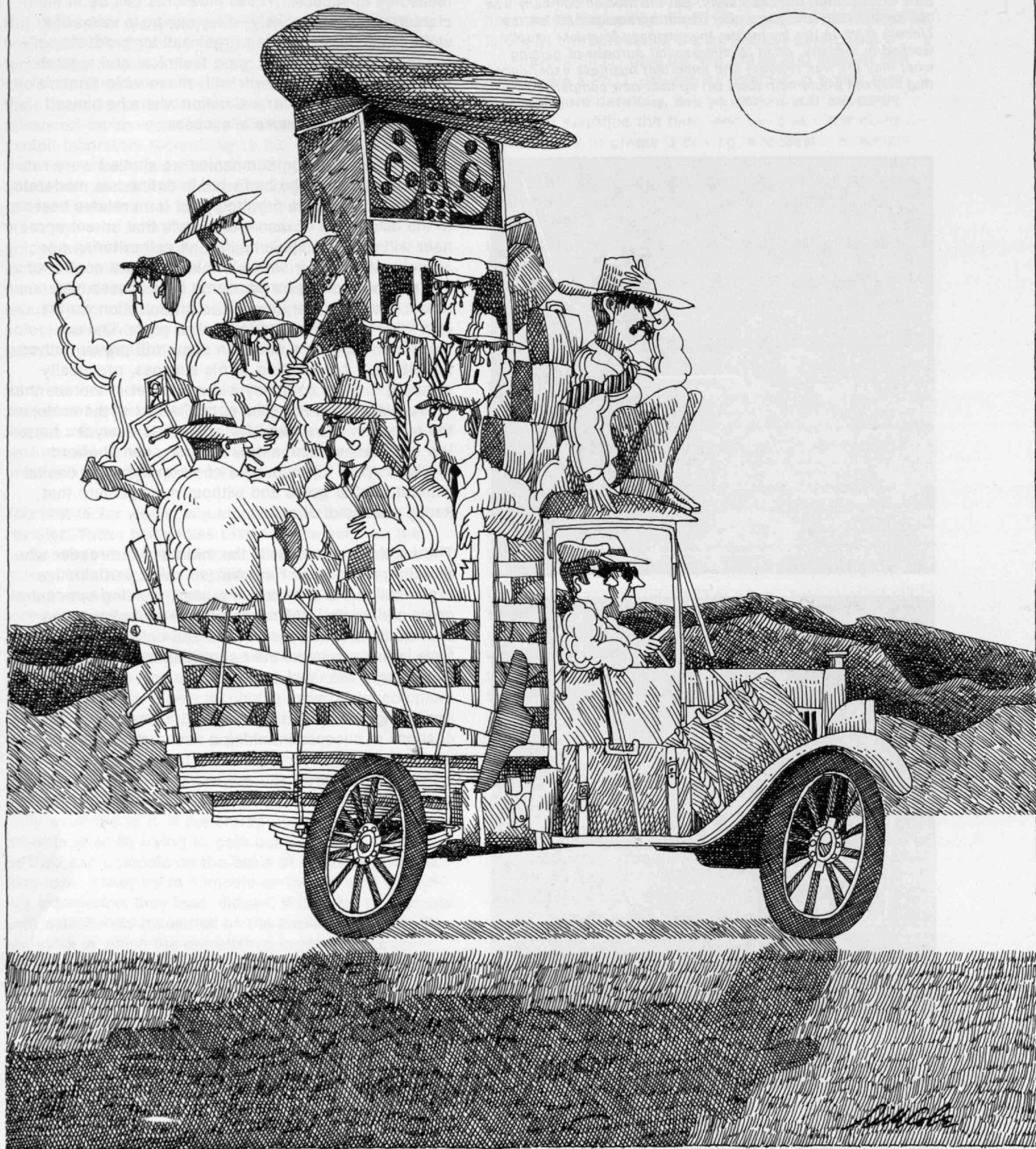
Most high-performing companies we studied were run by entrepreneurs who had what is defined as moderate need for power. This psychological term relates best to the leadership or managerial style that an entrepreneur will practice. He is neither an authoritarian nor an autocratic leader who will take absolute control of any organization he forms; nor is he a laissez-faire leader who lets everyone in the organization do his own thing without regard for central goals. The authoritarian running a one-man show will prevent other people from contributing to his success, practically assuring that his company will use fewer resources than it has available to it. At the opposite end of the scale, the man with a low need for power lets everyone be a law unto himself, and a new company can ill afford to disseminate its resources of manpower and capital without central goals and without management that keeps a sense of direction.

The ideal entrepreneur is the middle-of-the-roader who is willing and able to run what we call a participative organization. He is indeed the boss, pointing out central goals and central objectives. But he also shares responsibilities with subordinates and colleagues who have latitude to make their contributions as best they can.

According to our studies this ideal entrepreneur has chances of success in taking a new technology into the market place which are better than eight in ten.

Edward B. Roberts holds four degrees from M.I.T.: S.B. and S.M. in electrical engineering, S.M. in industrial management, and Ph.D. in economics. He is active as a consultant to many firms, as co-founder of three companies, and as a director of several new-technology enterprises such as those he describes in this article; and he is the author of a number of papers on management subjects. He has been a member of the Institute teaching staff in the Sloan School of Management since 1958.







The "one good man," the master scientist who shores up a corporate research and development group, has become a team, as scientists begin to migrate together. How to use it takes some skill from management

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# Scientists Who Migrate in Teams— And How to Manage Them

Scientists in American industry are operating within the ferment of dramatic technological change; they occupy, at the same time, positions of great importance and great limitation. They now influence the policies of business, government, and education.

Yet since the beginning of the Second World War, industrial scientists have been subject to more vituperation and internal stress than at any other time in our nation's history. Some of them fear that the nuclear weapons and techniques of mass destruction they have put into government hands may lead to world catastrophe. And more and more scientists now work as employees in corporate spheres. Most of their traditional autonomy in deciding what needs researching and how it will be done has vanished. A variety of organizational devices pressure them to conform in various ways. They face a dilemma: how to be both "professional men" and "organization men" at the same time.

Scientists react to this dilemma in several ways, most of them dysfunctional to the research and development company. They may rise in the organization, or they may leave it; they may use psychological defense mechanisms; or they may become apathetic and disinterested. All these adaptive responses are reinforced by the norms of their professional organizations and/or of their immediate work teams. The only healthy solution is for management to practice techniques of "power equalization." Participative management, project management, and the dual hierarchy are three of those most widely discussed and commonly used.

Another useful and subtle tactic that has gone unnoticed in the literature suggests that management recognize its scientists' "propensity to team" and adjust its personnel practices and organizational policies accordingly. That is, *instead of considering its scientists as isolated individuals, to be dealt with one at a time, progressive management must regard them as members of integrated work teams.* It must hire them as a team, organize them as a team, and, finally, manage them as a team.

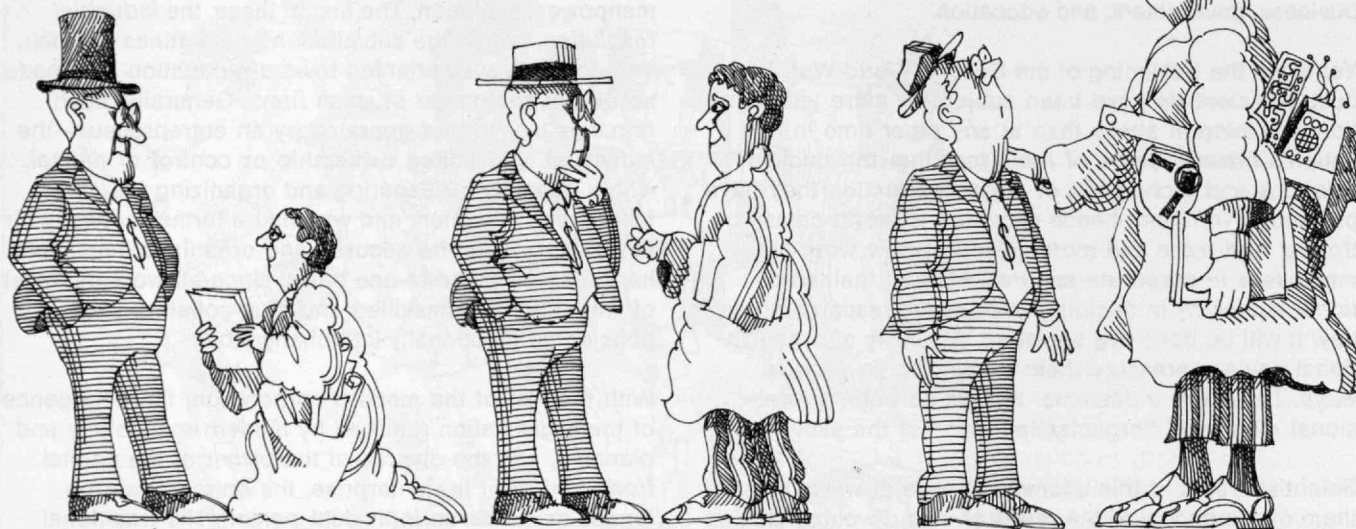
We should, perhaps, reflect on the inclination of scientists to team: its development, its possible determinants, its merits, and its limitations. It is already a prevalent practice, and it implies changes in both the design and management of research and development groups.

## What Management Practices Have Been

As times change, so does the practice of management. In sequence, we have experienced the influence of the industrial revolution, the managerial revolution, and the manpower revolution. The first of these, the *industrial revolution*, began the substitution of machines for men. The economy was oriented toward production and made up of a huge number of small firms. Generally, each firm was owned and operated by an entrepreneur—the individual who united ownership or control of capital with a capacity for securing and organizing the other factors of production, and who had a further capacity for innovation. When he secured and organized employees, he did so on a one-to-one basis, since all workers, most of whom were semiskilled and blue-collared, were considered functionally interchangeable.

With the rise of the modern corporation, the emergence of the organization required by modern technology and planning, and the divorce of the owner of the capital from control of the enterprise, the entrepreneur no longer exists as an individual person. His traditional functions of risk taking and innovation have been institutionalized. Management literature has recognized this classic change, known as the *managerial revolution*. It replaced the entrepreneur, as the directing force and the supreme technologist of the enterprise, with the management group. This group is a collective, imperfectly defined entity, designed to innovate as well as to secure the other input factors—including men, still one at a time—and combine them in a proper mix to yield a given output.

The space age has brought a fundamental change in the structure of the American economy. From a goods-producing economy, and it was that as recently as World War II, America has changed into what Peter Drucker calls a "knowledge economy," or one where knowledge is the main investment, the main cost, the main product, and the livelihood of the largest group in the labor force. The product market of that economy is dominated by "knowledge industries," which produce and distribute ideas and information rather than goods and services. The labor market, on the other hand, is operated by the "knowledge workers." Corporate scientists are the elite of these workers because they are the supreme technologists of our time and therefore the ones capable of leading us into a splendid future. These scientists are steadily growing in size and power, in-



fluencing not only corporate but also public policies.

The relatively strong position of corporation scientists today is often reflected in their rejection of the organizational traditions of the firm as well as in their propensity to migrate in teams. Though almost all technological corporations comprising the knowledge industries have abandoned the staff-line organization ideology and sought a new one adapted to the needs of the knowledge workers, only a few of these corporations have made corresponding modifications in their personnel practices. In such a pioneering minority, employment of knowledge workers, especially of scientists, on an individual basis, is slowly giving way to the hiring of such individuals as members of a team.

### What Management Is Learning

As suggested above, the trend toward team hiring is not universal. In a few leading companies it is followed eagerly; in many others only reluctantly. Unfortunately, the experience of this significant minority has scarcely been analyzed and publicized. We suggest that the lessons of their experience should stimulate thought about the applications of the team idea over a broad spectrum of corporate situations. Several illustrations of team hiring of scientists follow:

Motorola, Inc., hired 18 scientists and engineers away from General Electric's Semiconductor Division. Then, last August, it lost seven of its senior scientists, along with their boss, to Fairchild Camera. This exodus helped Fairchild fill in the gap in its senior management personnel occasioned by the flight of its former general manager, along with three of his assistants, to National Semiconductor Corporation. Six months later, 35 other professional scientists and engineers followed their former leader to National.

The computer industry is following the lead of the electronics industry. Last August, James Ling of Ling-Temco-Vought hired ten junior scientists from I.B.M. to staff his Computer Technology, Inc. This was not the first substantial loss in I.B.M.'s history. Ross Perot, one of Texas's youngest and richest millionaires, hired some of his co-workers from I.B.M. to man his new Electronic Data System Corporation.

A few years ago, a major Detroit company mounted an intensive recruiting drive to attract scientists. The company sent four of its top scientists on a tour of the nation. Their assignment was to talk to as many scientists as they could buttonhole, discreetly selling the Detroit company as a good place to work. The campaign



failed. All four of the touring scientists were hired by another competitor before they returned home.

The team of Dr. Frank Geldard and Dr. Carl Sherrick, both of Princeton's Cutaneous Communication Laboratory, provides another example of team hiring. The two men work well together. Geldard is the dreamer while Sherrick is the tinkerer. The latter earned his doctorate under Geldard at the University of Virginia. When the cutaneous research project at Virginia was expanded, Geldard sought out his former student and brought him back to work with him. In 1962, a chair at Princeton became vacant and was offered to Geldard. Before accepting, he made sure there would be room for Sherrick.

The forces that urge scientists to team—and that, in turn, contribute to the gradual shift in the unit of analysis from the individual to group—are not difficult to identify. For analysis, they will be grouped under two headings: (1) the supply side: the reasons for scientists to team; (2) the demand side: the reasons for employers to want teams.

### **The Supply Side: Why Scientists Team**

◇ As already pointed out, the corporate structure creates for the professional scientist an unresolved conflict between his traditional emphasis on autonomy and his position as an employee. He can resolve that conflict either individually, as described before, or collectively.

A group of two or more scientists can often sell their professional expertise as members of a team and, thereby, combine the power of their knowledge as individuals with that of their number. Viewed in this light, a team is a *countervailing power tactic* on the part of corporate scientists to assert their power and compensate for their loss of autonomy. In effect, the team offers the benefits of a union.

◇ The contemporary scientist is the upgraded and well-paid successor to the craftsman of yesterday. He learns not only in the classroom and in the lab, but also under *the tutorial system of the university*, by serving a substantial apprenticeship under a master scientist.

This apprenticeship can be highly personal, as he works for a man, not for an institution. It can mature into friendship and, eventually, partnership. This was the experience of Edgerton, Germeshausen, and Grier. Foreseeing a chance to earn money with their growing ability to study devices and phenomena in fast motion, they formed a corporation to pool abilities and share whatever earnings came their way. Since the Manhattan Project, their firm, EG&G, Inc., has been the scientific organizer for almost every U.S. atomic test—above or underground.

◇ In a time of rapid technological obsolescence, only a few talented scientists can be certain of their continued development and success, even in the near future. As an *anti-obsolescence device*, they may want to form close partnerships with one or more of their colleagues to ensure that they are safely abreast of scientific and technological innovations.

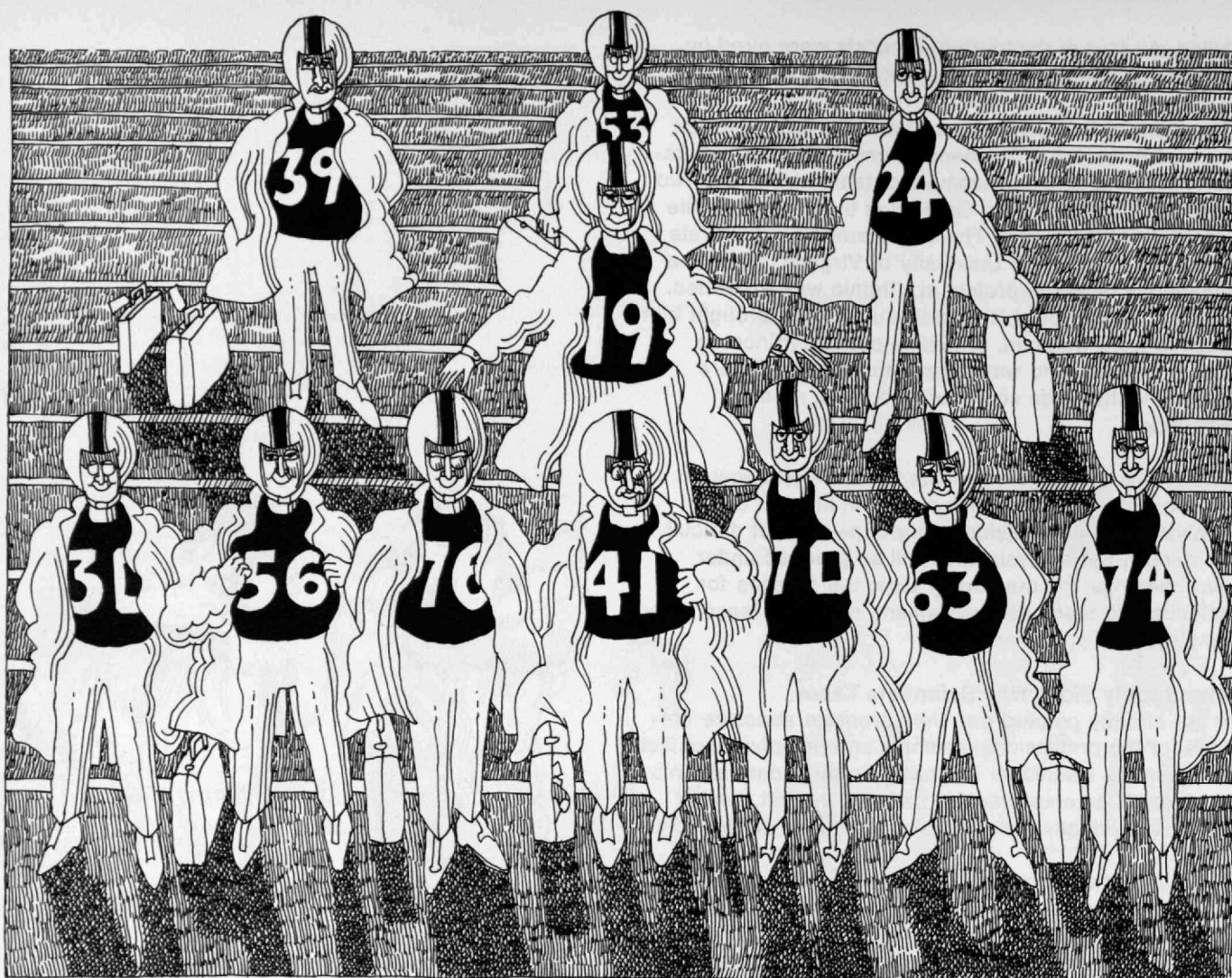


### **The Demand Side: Why Employers Want Teams**

◇ There is an increasing number of tasks that greatly exceed the competence of any single scientist. In our space age there are few, if any, scientists able to cope with all the tasks because it is becoming increasingly harder to see the context of the whole. We encounter such tasks not only in connection with the development and design of complicated systems, but also as distinct subspecializations. Separate areas have developed within conventional branches of science, so that even problems of basic research require a division of labor among the various specialists. Thus, the complexity of present technology makes it mandatory for scientists to contact each other, work together in a team, and publish jointly. *The growth of specialization* makes teamwork both necessary and likely.

◇ The increasing demand for scientific activity has, in recent years, resulted in a critical shortage of scientific personnel. Since the supply of scientists has been relatively inelastic, employers must outbid each other to fill their needs for scientific manpower. They must offer higher salaries to lure scientists away from a competing employer, another state, or a foreign country. But this strategy does not always succeed because a scientist is usually motivated by what he does, not by how he is compensated financially. *A new recruitment strategy* is needed to fit the seller's market.





Finding that money is of limited potency, employers experiment with a number of subtle strategies geared to the peculiar needs of the scientist. One of these is to hire prospective scientists not on a one-to-one basis but as members of a team, thereby making it possible for them to continue to see friends and colleagues.

◇ Today, in an age that produces scientific discoveries at a bewildering rate, the old distinctions between science and technology, between "scientists" and "doers" are losing their meaning. One must understand a scientific discovery to do anything with it—to use it and sell it. A doer nearly needs to be a scientist himself, especially if he is trying to make use of such difficult sciences as physics and chemistry. If not a scientist, he may not even understand the language, let alone the principles. Yet, a team of scientists can integrate their knowledge and skills, thus *bridging the gap between theory and practice* and enabling an improvement in both.

◇ Be it chicken or egg, a *subtle shift in management ideology* is under way, the magnitude, nature, and antecedents of which are somewhat elusive. It began with the recognition of a need to make the research and development group more democratic and to use it as a vehicle for personal growth. Management saw a need to preserve the spirit of professional individualism and, at the same time, to help the research scientist become

a member of the research and development organization. Modern concepts of man, power, and organization are replacing the older mechanistic ones. Man is no longer seen as a machine that can be acted upon by a series of incentive and control systems. Management ideology and power are no longer based on coercion and threat but on knowledge and collaboration. And an organization is no longer seen as an impersonal bureaucratic machine but as a democratic social system.

### Implications of Team Hiring

The implications of the trend toward team hiring are numerous and varied. Collectively, they also fall into two areas: administrative action and organizational design.

At the outset, the whole area of supervisory practices may be altered significantly. First, if a project or department is to achieve its goal, its supervisor must build a team and become one of its members. He must try to place friends together as well as to keep unfriendly workers apart. He must also ensure that the men in the team truly believe that teamwork and professional autonomy are not necessarily incompatible.

The situation is similar to football, where each individual on the squad has his own objectives and makes his own tactical plans. He must have the opportunity to contribute individually and visibly to satisfy his ego needs.

At the same time, his primary work objective must be the contribution he makes to the goal of the team, approved and coordinated by his immediate manager.

Having built a scientific team, and realizing that he belongs to it, the manager of corporate scientists will adopt a new attitude to foster their creativity. Rather than an authoritarian boss who suppresses the needs and wants of intelligent subordinates, he will be a democratic leader who listens and encourages. He will work at converting crude guesses into understanding, glimpses into visions, plans into action, and excitement into results.

Another corporate area that must adapt to the team concept is that of recruiting and dismissal. In hiring new scientists, the primary consideration will be the key man or the master scientist possessing the most critical skill; his team will usually go along with him. The recruitment process may be simplified, thereby, since the number and complexity of interviews will probably be reduced. But the potential savings in hiring are not necessarily free of cost: turnover will be a more delicate concern. If the key man is not happy in his job, he will leave. His resignation may set off the exodus of his fellows—their strategy being “united we stand; together we fall.” If dismissal is considered, therefore, management must realize that it can’t fire a leader without risking this “multiplier effect.” It must perceive that, although hiring may be an inexpensive process, firing can be a costly one.

Training and development must also begin to center on the team as the unit of analysis. For instance, the training and development of astronauts will necessarily be done on a team basis. Classes composed of prospective or actual crews, rather than of disconnected individuals, will focus on common problems and thereby encourage learning that works toward the goals of the team. This training can be more practical in nature, and education and development can be primarily for system diagnosis, renewal, and effectiveness.

A final managerial implication of the team concept concerns compensation practices, particularly the area of incentive systems. Group incentive systems will eventually replace individual ones and profit sharing, team quotas, bonuses, and commissions will be emphasized. These promise additional sources of job satisfaction, as well as the development of better team productivity.

### **Some Changes in Corporate Structures**

A major consequence of the trend toward team hiring may be the emergence of new and more fluid organizational structures to suit the needs of scientific and technical personnel. An innovative group will call for different sets of relationships among its people. An essential ingredient will be flexibility. Yet there must also be authority, and discipline, and someone who can make final decisions.

How can all of these requirements be met? There are at least three familiar organizational devices that can produce, with varying degrees of success, the necessary

blending of individualism and teamwork. These are the *functional team*, which is a special version of Likert’s overlapping group form, the *project team* or the task force, and the “*minisystem*” or the “*micro-company*.” These team-based cooperative forms of organization are too well known to require detailed description.

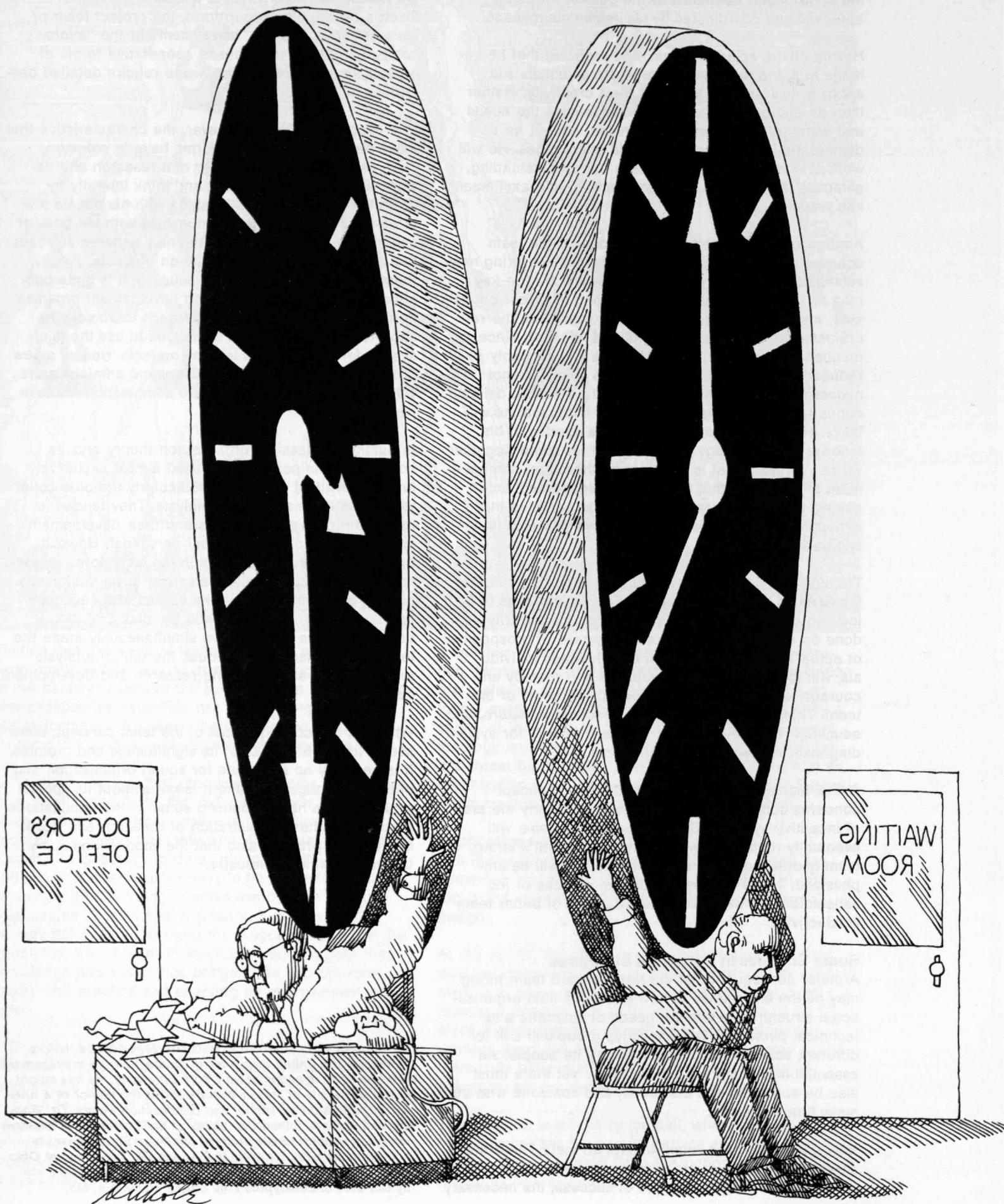
It is important to note, however, the characteristics that these newer organizational forms have in common. First, each forces the manager of a research and development unit to look, work, and think laterally by establishing working relationships with his equals and to de-emphasize vertical relationships with his boss or subordinates. As a corollary, the new patterns all render the classical staff-line organization obsolete. Finally, these forms are not mutually exclusive. It is quite possible for the same research and development organization to follow the task-force approach to achieve a short-term goal and at the same time to use the minisystem for complex and lengthy projects. Hence, a new problem for research and development administrators will be choosing the appropriate combination of these patterns.

In summary, classical organization theory and its counterparts in personnel focused almost exclusively on the individual employee, particularly the blue collar worker, as the main unit of analysis. They tended to ignore the problems of teams and their development among scientific and technical personnel. However, the growth of professionalism in the labor force in general, and among scientific personnel in particular, the coming of automation, and the spread of a new managerial ideology have all made the classical theory obsolete. These factors have simultaneously made the team, rather than the individual, the unit of analysis for organizing and managing research and development departments.

Whatever the consequences of the team concept, there seems to be little doubt of its significance and promise. It is certainly no substitute for sound organization and effective management, and it is not without its special problems. We have proposed some of the implications pertinent to the administration of research and development and propose also that the suggestions apply to other activities in industry.

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Where 100 physicians meet hundreds of patients every day, the organizational problems appear—at first glance—to be insoluble. Here is an account of one promising attempt, being conducted at Boston's Lahey Clinic, to reduce the waste of valuable time. Can the patient, though his records are handled by a computer, still feel the security of a doctor's care? (The Clinic recently received a \$480,000 H.E.W. grant for further work in this field).

John F. Rockart  
Associate Professor of Management, M.I.T.

# A New Look at Clinical Schedules

Headlines in recent months have been both eye-catching and alarming: "Hospital Beds \$100/Day," "The Crisis in Medical Care," "The American Medical Care System—a Nonsystem." The phrases differ, but it is clear enough that there are serious shortcomings today in the process of managing the delivery of medical care.

That this should happen in the United States is a bit of a puzzle. American technology and "management know-how" have been credited with being the best in the world. What has happened in medicine?

Many factors have contributed to the current less-than-satisfactory situation. To cite some: until recently there have been relatively few professionally trained managers in the medical world. The ability to choose between services knowledgeably in terms of costs and benefits, to which consumers have become accustomed in other areas, has no real counterpart in health care. Physicians, working primarily in a "cost-plus" kind of world, have had little incentive to reduce costs or to improve existing systems. And—which is important—the industry is heavily labor-intensive, in an inflationary era in which the major brake on rising costs in other industries has been automation.

There are other factors, but let me select one in particular. While many millions of dollars have been spent on basic research on biological processes, the process of delivering the fruits of this research to the patient population has been left relatively unstudied. To a great extent, medical care systems have just grown. Today, faced with an overwhelming demand for change, it would seem important to attempt first to define and fully understand the problems. Some work of this kind has been performed, of course, but little of a systematic nature.

## Finding the Problems

The uncovering of problem areas is simple to recommend but difficult to execute. Today, we are the masters of many methods of solving problems, yet very little has been written about ways of finding them.

In a paper recently printed in *Industrial Management Review* (Fall, 1969) Dean William Pounds of M.I.T.'s Sloan School of Management states that managers find problems by comparing an existing situation with a model of the situation. Where differences are noted be-

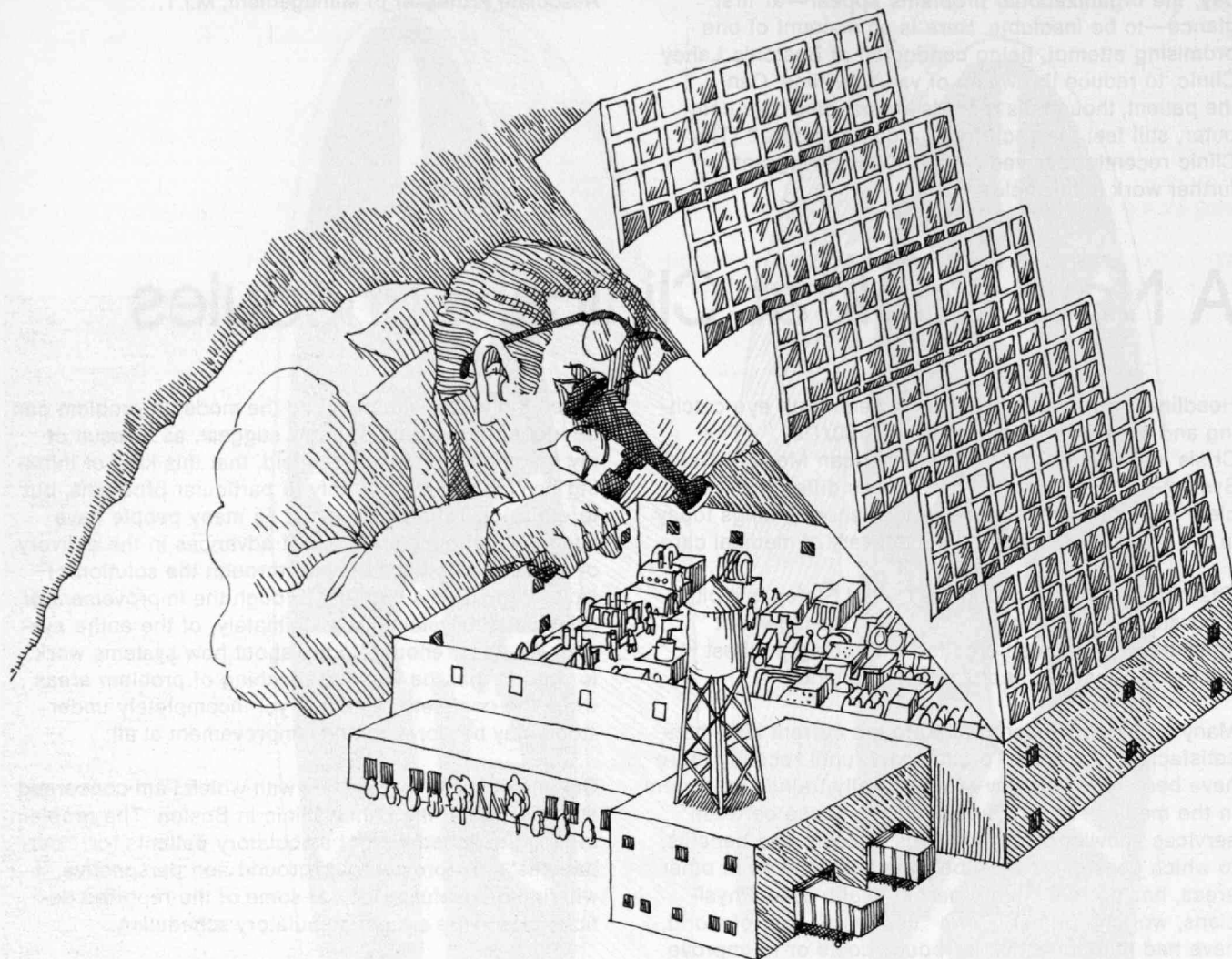
tween the actual situation and the model, a problem can be identified. I would strongly suggest, as a result of my research in the medical field, that this kind of thinking can be applied not only to particular problems, but to entire operational systems. As many people have suggested, the most important advances in the delivery of medical care will arise not through the solution of isolated problems but only through the improvement of principal subsystems and, ultimately, of the entire system. We know enough today about how systems work to predict that the isolated patching of problem areas while the complete system is yet incompletely understood may be worse than no improvement at all.

One medical delivery system with which I am concerned at present is at the Lahey Clinic in Boston. The problem area is the scheduling of ambulatory patients (or, "outpatients"). To provide background and perspective, it will first be useful to look at some of the reported deficiencies in the area of ambulatory scheduling.

## Symptoms of Distress

In the past few years, research on the scheduling of visitors to multiphysician facilities has unearthed a number of symptoms indicative of underlying problems:

- ◇ Physicians are either overscheduled or underscheduled, the patient load rarely providing a good match with available resources.
- ◇ In those clinics which attempt to schedule patients for more than one visit or laboratory test in a day, patients often wait around the medical facility for long periods between the scheduled appointments.
- ◇ In those clinics which do not do so, patients often wait many days or weeks before seeing their next indicated specialist.
- ◇ At the scheduled appointment time, the physician often is still unavailable, resulting in a further lengthy wait.
- ◇ Patients are at times scheduled to see physicians other than the specialists most suited to their particular problems, resulting in inefficient use of physicians' time and additional cost to the patient.
- ◇ Clerical personnel competent to plan the physicians' schedules and execute the necessary paperwork are becoming increasingly hard to find.
- ◇ The paperwork is so complex that frequent clerical errors are inevitable, resulting in incorrect doctor schedules and inconvenience to patients.



The Lahey Clinic, founded in 1925, currently has a staff of approximately 100 physicians, divided into a dozen major specialties and more than 20 recognized subspecialties. Between 600 and 700 patients every day must be directed to the correct specialists and clinical test procedures.

As a nonprofit group practice, the Clinic is comparable in many ways to hundreds of other group practices throughout the United States. In its basic function and facilities, it also bears some striking similarities to the majority of hospital outpatient departments.

At the Clinic, appointments are requested by mail, telephone, or personal appearance and are scheduled by a team of approximately 20 appointment secretaries. A secretary determines from the patient's account of his symptoms what appointments seem to be needed and draws up a schedule for each physician. In so doing, the secretaries try to ensure that patients will spend the minimum time necessary at the Clinic.

The appointment secretaries face a major dilemma, which can be summarized as follows: On the one hand, if the patient is scheduled to see more doctors than he requires, the first doctor who sees him will very probably recognize this fact and cancel the excess appoint-

ments; but the "doctor time" thus released (and therefore available) may not be used by other patients, for there is no backlog of additional patients waiting for a particular doctor. The other horn of the dilemma is that if the patient is scheduled to see *fewer* doctors than necessary, the additional doctors whom he needs to see will probably be booked completely on the day of his visit. The necessity of further visits may place a heavy burden on the patient.

To "get a handle" on such an uncertain and complex system, and to determine possible problem areas, two models were used. One of these, a composite description of the scheduling system used by four other major group practices, is perhaps intuitively acceptable as a problem-finding base. The other—the model used primarily at the Lahey Clinic—was based on industrial job-shop scheduling.

Although, at first blush, a comparison between an industrial job shop and an ambulatory care facility may appear illogical, the similarities are numerous. Each can be described in the following terms;

- ◇ A set of *facilities* which perform work;
- ◇ A *routing procedure* to direct a set of *items* through the facilities;

- ◇ *Precedence relationships* governing the order of visits to different facilities;
- ◇ *Production times* and *waiting times* characteristic of each facility;
- ◇ A *basic scheduling point* from which every item is "loaded" to the various facilities; and
- ◇ *Scheduling*, either *static*—loading facilities to some preset limit before the actual day of operation—or *dynamic*—a continuous rescheduling of facilities taking into account the latest events and conditions.

When the job-shop model is compared with the scheduling system utilized at the Lahey Clinic, some major similarities and some striking dissimilarities become evident. The similarities can be illustrated by a discussion of the first two characteristics in the above list.

In the job shop, the facilities are a set of machines, grouped into various subsets or "machine groups." All the machines in a machine group have the same general performance characteristics, but each group may be further subdivided. (For instance, within a machine group of boring tools, there may be a subgroup of automatic borers, which are efficient for long runs but not for short jobs because of the time it takes to set them up. Some of these automatic borers may also have a "subspecialty," being able to produce a boring that almost always remains within a certain small tolerance.)

Furthermore, some machines are interchangeable. For any operation, a type of machine not specifically designed for that operation may be substituted for a more specialized machine, with some loss in efficiency. (The simplest example is the substitution of a hand-operated borer for an automatic borer, in a large-quantity job—where the latter is more productive—following overloading or breakdowns.)

The facilities of the clinic are basically of two types—physicians and test facilities. The physicians in a group practice are usually highly specialized, but as with the machines in the job shop, there are usually several physicians with similar specialties; that is, there are "physician groups" just as there are machine groups.

Within these general medical groups—there are about a dozen of them—there are also subgroups. Internal medicine, for example, has well-recognized subspecialties such as cardiac, vascular, hematologic, and thyroid. Beyond this, today there are often sub-subspecialties (for example, a hematologist may particularly concern himself with leukemia).

Within the clinic, it is also feasible at times to call upon one "facility"—a specialized physician—to treat a patient who should ideally be seen by a member of another specialty, although again, there is some loss in efficiency in using a doctor whose prime field is allergy, for example, to see a patient with a thyroid condition (if the thyroid condition is definite or highly probable).

In the "job shop" the items are products—starting either as raw materials or in a semifinished condition—which must be developed as they are fed through various machines according to a *routing procedure*. In

*The largest cause of appointments with the wrong physician is the failure of appointment secretaries to extract enough information from the incoming patients.*

### Scheduling Errors Caused by Insufficient Information

- ◇ A 20-year-old patient who was quite deaf asked for a "general checkup." An added appointment with ENT was necessary.
- ◇ A patient had been taking medication for a thyroid condition for years but did not mention it. A consultation was added with a thyroid specialist.
- ◇ A male patient had a very bothersome urinary problem. It was not mentioned to a female appointment secretary. Consultation with urologist added.
- ◇ A heart condition was not stated to the appointment secretary, although the patient's doctor was treating it. Cardiac consultation added.
- ◇ Patient stated hemorrhoids and sinus trouble to doctor, but not to secretary. Two appointments added.
- ◇ Only a general checkup was asked for by the patient. A specific history of long-standing abdominal pain was, however, related to the physician. One additional consultation.
- ◇ Endocrinology consultation added when the primary doctor found the patient had been taking medication for adrenal insufficiency.
- ◇ A woman did not mention gynecologic problems until she saw the initial doctor. A male secretary had made the appointment.

the same way, there is an appointment schedule which moves a patient through the clinic. Just as there is an optimum routing for a product through the specialized machine facilities, so there is an optimum appointment schedule for a patient—for each patient, there is an ideal series of doctors and a preferred series of tests.

### Three Major Problems

A continuation of this comparison provides a rather strong case for the contention that the two systems are highly similar. However, once the fact of this resemblance is established, it is the dissimilarities that take on the greater interest. In the Lahey study, 17 separate areas of dissimilarity ("problems" in the Poundsian sense) were identified. These were factorable into three major problems, most reflecting significant differences between industrial and clinical scheduling.

The first of these three macro problems was the need to obtain more and better "external" information about patients—meaning information not currently in the files of the clinic. This is basically information about new patients and their symptoms.



Sample page (left) of a questionnaire that is being sent, experimentally, to each new patient at Lahey Clinic. The patient's information, after processing for the computer, can be printed out automatically, as at the right, as a medical history adapted to the needs of the physician.

HAVE YOU HAD ANY OF THE FOLLOWING CONDITIONS IN THE LAST 5 YEARS

Frequent night sweats that completely drench your clothes . . . . . YES 155 NO       
Hay fever, or frequent sneezing spells . . . . . YES 156 NO       
Pneumonia . . . . . YES 157 NO       
Frequent Bronchitis . . . . . YES 158 NO       
Pleurisy . . . . . YES 159 NO       
Bronchial asthma . . . . . YES 160 NO       
Emphysema . . . . . YES 161 NO     

HAVE YOU HAD ANY OF THE FOLLOWING

Tuberculosis . . . . . YES 167 NO       
Close contact with people who had tuberculosis (including anyone in your family) . . . . . YES 168 NO       
A positive tuberculosis skin test . . . . . YES 169 NO       
A chest x-ray within the last two years that was reported as being abnormal . . . . . YES 170 NO     

DO YOU GET PAIN, DISCOMFORT, TIGHTNESS, OR PRESSURE IN YOUR CHEST WHICH REOCCURS AT LEAST EVERY MONTH . . . . . YES 191 NO      THEN OMIT QUESTIONS 192-215

HOW OFTEN DOES IT OCCUR

Once a month . . . . . YES 192 NO       
Every 2 or 3 weeks . . . . . YES 193 NO       
More than once a week . . . . . YES 194 NO       
Every day . . . . . YES 195 NO     

IS THE CHEST PAIN OR DISCOMFORT LOCATED

In the middle of your chest, under the breastbone . . . . . YES 198 NO       
On the left side only . . . . . YES 199 NO       
On the right side only . . . . . YES 200 NO       
On both sides . . . . . YES 201 NO     

IS THE PAIN OR DISCOMFORT MADE WORSE BY BREATHING DEEPLY . . . . . YES 202 NO     

In the job shop, routing is a well-defined process, with very high certainty that each "appointment" is an appropriate one. This is not true of the clinical situation. Secretarial routing efficiency at the clinic was found to vary widely between different classes of patients. Some categories had error rates—that is, inappropriate appointments—as high as 33 per cent. From this alone, the system would appear inadequate, but an analysis of the routing errors led to an interesting conclusion. By far the biggest cause of ill-chosen appointments was the failure of the appointment secretary to elicit enough information from the patient. The missing information was always obtained by the physician during the patient's first appointment. To do this the doctor generally had to apply only his ordinary "extractive" talents, rather than his more valuable diagnostic ability. (Examples of such cases are shown in the chart on the previous page.)

Second, a need became evident for better estimates of the time that each patient will spend with each doctor.

PATIENT NO      PATIENT NAME      M.O. 5/68      RUN DATE

T000273      DOE, MARY           03/03/69

AGE - 32 YEARS      SEX - F

FAMILY HISTORY  
UNLISTED FAMILIAL DISEASE.

SOCIAL HISTORY  
MARRIED. HIGH SCHOOL GRADUATE. HOUSEWIFE. PT HAS SMOKED CIGARETTES—MORE THAN 10 YRS. 1 TO 2 PKS/DAY. ALCOHOLIC CONSUMPTION—A DRINK OR TWO A DAY.

RECENT WEIGHT LOSS.

HEENT SYSTEM  
NOTES SINUSITIS.

RESPIRATORY SYSTEM  
TUBERCULOSIS CONTACT.

CARDIOVASCULAR SYSTEM  
NOTES CHEST PAIN EVERY DAY. LOCATED SUBSTERNALLY, IN RIGHT CHEST ONLY. PALPITATIONS AT REST. NOTES PEDAL EDEMA. LEG PAINS WITH WALKS. REMIT UPON RESTING. NOTES VARICOSE VEINS. FINGER COLD REACTION. HISTORY HEART MURMUR.

GASTROINTESTINAL SYSTEM  
INDIGESTION ONCE/MONTH. HISTORY BLACK STOOLS, WHILE ON IRON THERAPY. HX OTHER ABD. SURG.

MUSCULOSKELETAL SYSTEM  
HAS JOINT STIFFNESS.

GENITOURINARY SYSTEM  
NOTES INCONTINENCE. NOCTURIA FOR AT LEAST 1 YR.

HEMATOLOGY

ENDOCRINE SYSTEM  
SKIN TEXTURE CHANGE. HX HYPOTHYROIDISM.

DERMATOLOGY  
HX HIVES. HAS NEW SKIN GROWTH. ALLERGY TO COSMETICS.

NEUROLOGICAL SYSTEM  
PT. NERVOUS. PT. THINKS COMPLAINTS FUNCTIONAL. INSOMNIA NOTED.

FEMALE SYSTEMS  
HAD BREAST PAIN. HX OF PREGNANCY.

For the job shop, estimating the time that will be spent at each station is straightforward. The "production time" taken up by a patient's visit to a doctor's office is subject to much more uncertainty. Naturally enough, doctors are much more variable in their working output than machines, and patients do not present their medical problems for solution in as predictable a manner as materials present their properties. At the Lahey Clinic, many patients took two to three times the amount of time for which they were scheduled, while others took between one-third and one-half of this time. The result is a significant fluctuation in the physician's daily load. Nevertheless, there are indications that appointment times, at any rate for patients who have been seen previously, could be more accurately determined than they are at present.

The third shortcoming was a need for more effective access to the information currently available in the clinic, and for greater ability to manipulate this informa-

tion. Industrial scheduling is becoming increasingly computer-oriented, whereas in medical scheduling the abilities of the computer have been little utilized. Computerized scheduling systems tend to reduce clerical error and to facilitate access to and use of the extensive data base necessary for most scheduling functions. In addition, on-line scheduling systems provide the ability to react to events such as absences which disturb the initial schedule.

A full discussion of the solutions to each of these problems is not possible here, but as an example, a solution to the "external information" problem, currently being field-tested at the Lahey Clinic, may be of interest. The chart on the left shows a questionnaire which is being sent out to each new patient. The positive symptoms checked by the patient are translated into point-scores relating to each of the 22 specialties (see right). This scoring is then run through a set of scheduling rules.

Initial results suggest that this is indeed an effective way of obtaining more and better external information for scheduling. An offshoot of the system is shown on the left—a printout for each patient, which provides the physicians who will see him with some initial medical-history information of a rather comprehensive nature.

Can a medical scheduling system ever approach the accuracy now found in industry? Because the human element plays a much larger part in the medical setting, it is dubious that even the somewhat less than perfect scheduling efficiency of the job shop can be reached. On the other hand, it is realistic to expect at least some improvements in medical scheduling from its current relatively low level of efficiency.

### For Hospital Outpatients?

Although the probability of improving scheduling in the group practice setting is good, this optimism cannot as yet be transferred to the typical hospital outpatient department. Recent research at the Lahey Clinic and the Massachusetts General Hospital strongly suggests that for a scheduling system to be effective there must be full-time physicians, individual patient appointments, a commitment to total patient care, an incentive on the part of the staff to adopt improved techniques, and several other conditions which do not exist in most hospital outpatient departments at present.

In general, hospital outpatient departments are hampered by some or all of the following problems:

- ◆ Lateness or nonappearance of physicians.
- ◆ Frequent nonappearance of expected patients.
- ◆ In some clinics, a stated need to retain "block" scheduling systems, as opposed to providing individual appointments.
- ◆ Difficulty—because of block scheduling—in coordinating multiple appointments on the same day.
- ◆ Lack of commitment to total medical care (and therefore less need for extensive scheduling systems).
- ◆ Lack of economic incentive on the part of the staff (since many are donating their time) to adopt more economic scheduling techniques.

On the basis of replies to the questionnaire shown at the left, the computer can generate point scores to indicate the patient's probable need for any of 22 specialties.

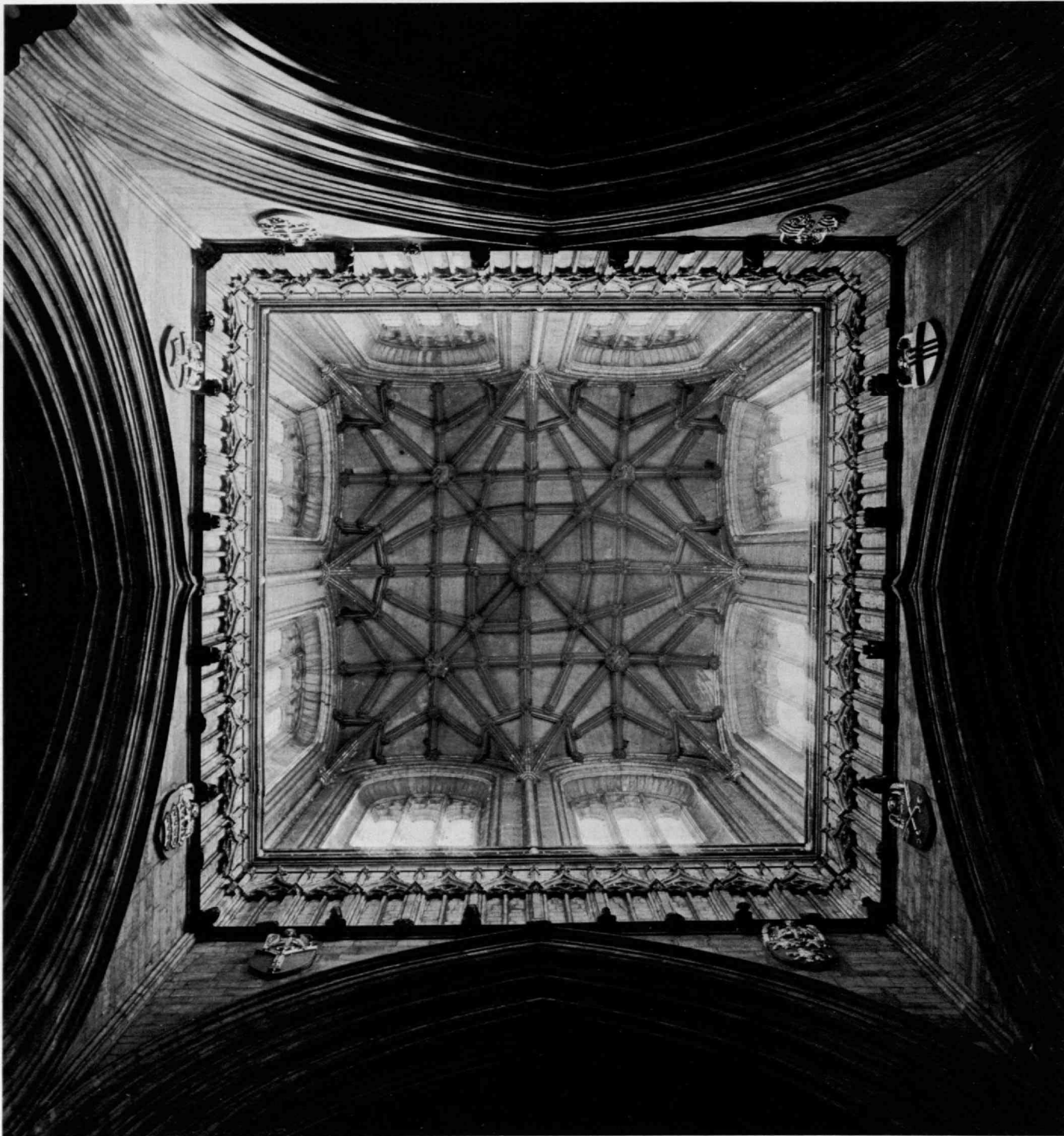
## Scoring in Four Dimensions: as Patient

PATIENT NO	PATIENT NAME
T000273	DOE, MARY
ALLERGY	9
CARDIOLOGY	23
CHEST	12
DERMATOLOGY	8
ENDOCRINOLOGY	4
HEMATOLOGY	0
ANTIBIOTIC THERAPY	0
NEUROLOGY	1
PSYCHIATRY	17
RENAL	6
RHEUMATOLOGY	7
THYROID	15
VASCULAR	15
EAR, NOSE & THROAT	2
GASTROENTEROLOGY	10
GENITOURINARY	5
GYNCOLOGY	8
NEUROSURGERY	0
ORTHOPEDIC SURGERY	2
SURGERY	7
OPHTHALMOLOGY	0
THORACIC SURGERY	0
CONTROL TOTAL #	14058

However, conditions are changing. The trend toward complete government sponsorship of medical care, exemplified by Medicare and Medicaid, is increasingly placing the "indigent" patient in a position formerly enjoyed only by the private client. There is a corresponding need to shift the standard of the administrative treatment of the outpatient toward that of the private patient. The current social revolution is placing increasing demands upon hospital outpatient departments for full-time staffs and more comprehensive care. (Some hospital O.P.D.'s, such as Henry Ford in Detroit, have in effect become group practices.) So it may well be that work on the scheduling of group-practice patients will be extensible to the hospital outpatient departments setting in the not too distant future.

*John F. Rockart has been associated for more than two years with research in the Sloan School of Management at M.I.T. on problems of hospital and outpatient management. He studied at Princeton (A.B., 1953) and the Harvard Business School (M.B.A., 1958) before joining the International Business Machines Corp. for five years—including two years on leave of absence as a member of the M.I.T. Fellows in Africa program. Professor Rockart came to the Sloan School in 1966, joined the faculty in 1967, and received the School's Ph.D. degree in 1968. The sketches accompanying this article are by Dill Cole of Eucalyptus Tree Studio, Baltimore, Md.*

York Minster is a structure of superlatives: it is the largest medieval cathedral in England, and its lantern tower, surmounting the crossing, is similarly uniquely large. The height from the floor of the church to its vaulting (below) is 184 feet. Each pier of this tower carries a load calculated at 3,850 tons, and when restoration began in 1967 the factor of safety against shear failure in the clay immediately underlying these piers was possibly as low as 1.3. (Photograph: Herbert Felton from the Royal Commission on Historical Monuments (England); Crown copyright.)





When architect, archeologist, engineer, and builder together bring their talents and disciplines to save the great York Minster, the metaphors of surgery are apt: a historic building must be treated like a living thing

Bernard M. Feilden  
Senior Partner, Feilden and Mawson  
Norwich, England

# Engineering in Four Dimensions: The Great Church as Patient

York Minster is one of England's greatest medieval cathedrals, and it is one of the largest Gothic structures in Europe. The church is over 500 feet long and 245 feet wide across the transepts, and its three towers rise to over 200 feet; the central tower is the biggest of its kind in England. No medieval cathedral in England is larger.

The Minster's present superstructure was built between 1225 and 1472 A.D., and it stands on the site of former Roman legionary headquarters buildings which were followed by a series of Saxon and Norman churches. The tower of a Norman cathedral on the site was severely damaged by fire in the twelfth century, and the central tower and lantern built to replace it in the thirteenth century collapsed in 1407. The present nave and chapter house were completed by 1350, the choir by 1425; the present central tower and western superstructures of the towers are the work of the fifteenth century.

The Minster is currently undergoing extensive restoration, to a total expected cost of about £2 million. A large part of the effort is devoted to underpinning and strengthening the existing foundations, the inadequacy of which had caused substantial deformation of the superstructure.

There were three principal zones of damage: the great central tower, the two western towers, and the east end. The basic trouble was that the area of the foundations was too small for the stratum of clay immediately underlying the building; this had led to excessive differential settlements and rotations. As was also suspected, the Norman masonry underlying portions of the superstructure was suffering from disintegration under the weight of the main piers and had inadequate lateral support.

## Surveys: Increasing Detail and Concern

This account properly begins with the Dean and Chapter of York Minster instructing the author, as their newly appointed Surveyor of the Fabric, to make a visual inspection of the whole fabric of this great church. It is difficult to explain the complexity of a Gothic structure which is the result of 250 years of fairly continuous building work by successive master masons, each of whom used slightly differing mouldings and details. The discipline of a visual inspection is to analyze, describe, view, and note down in a methodical way what can be seen. In this case the work took some 2,000 man-hours and resulted in a 500-page report presented to the

Greater Chapter in January, 1967.

The inspection was carried out bay by bay from west to east. A series of structural cracks about 1¼ inches wide and distortions were noted in the western towers. Then a complex group of cracks was noted in all the abutments of the central tower, together with fresh vertical cracks in the masonry of two of the four main piers, and distortions of the masonry in the transepts, where there was some outward sway. Then a series of vertical cracks, old because they were full of dust, were seen in the choir piers, and lastly the pronounced outward lean of the east end was easily visible with attendant cracks. All cracks were recorded on drawings and on a perspex model which made possible a three-dimensional assessment of the problem.

Not all the cracks shown were considered bad, of course; a building as large as York Minster has to allow thermal movements and differential settlements to take place. But fresh cracks in the heavily loaded central tower piers seemed to indicate something amiss.

## Must the Minster Be Closed?

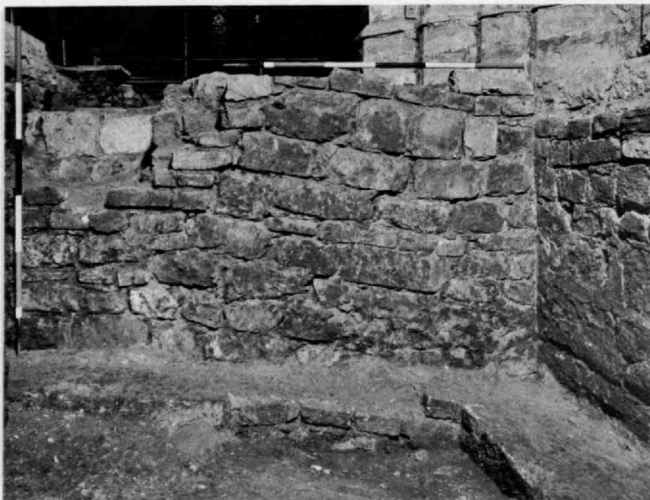
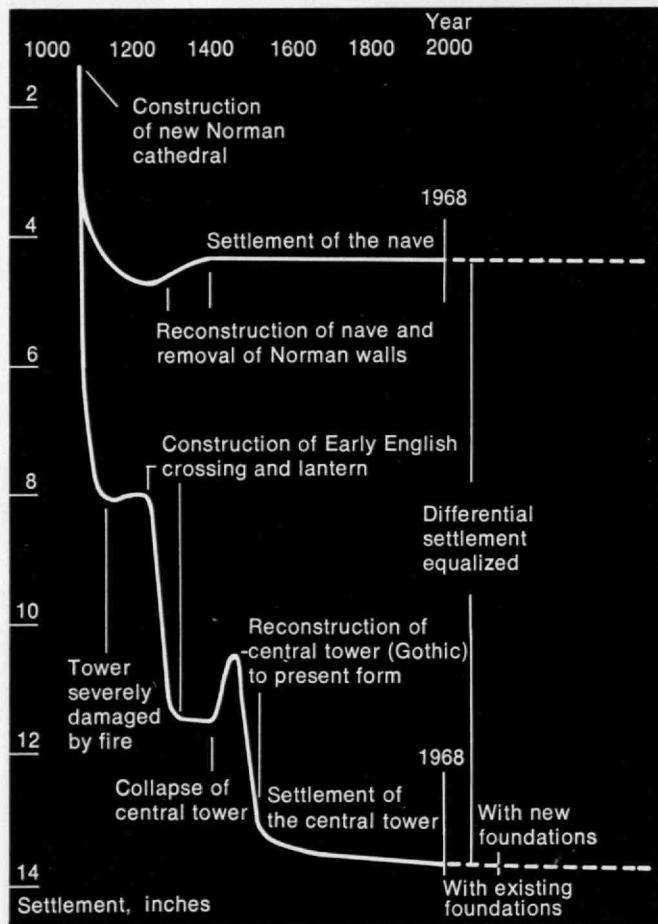
A small exploratory excavation at the base of one of the central piers exposed a series of large and complex—and some apparently fresh—cracks in the foundation masonry. It was decided to carry out a full-scale soil mechanics investigation and to study the possibilities of strengthening the main pier foundations of the central tower. The piers themselves were strapped as a precaution.

The quality of the pier masonry was tested in an ad hoc way by drilling holes, fitting probes, and pumping water in at 50 pounds per square inch pressure. This showed that the pier masonry was permeable and revealed one void into which 25 feet of hose disappeared!

Additional investigation also showed that the Norman walls which were used as footings for the two western towers were grossly overloaded and in poor condition, wide shear cracks had opened, and there was evidence of a tendency to burst. Glass telltales fixed to the cracks broke, and strain gage measurements quantified the amount of movement.

In July, 1967, the Surveyor of the Fabric warned the Dean that it might be necessary to close the Minster.

The relative settlements of the York Minster were studied in relation to events in its history and to previous building activities on the site. It will be noted that the whole Minster has settled some 4½ inches over and above the amount of settlement in Roman times. The outer walls have helped to contain the massive central tower, but settlement here has been severe; the northwest pier (photo) has settled most—about 13½ inches—because it was built over a Roman well. (Photograph: Royal Commission on Historical Monuments (England); Crown copyright.)



In an independent opinion, Robert Potter, a distinguished cathedral architect who has been carrying out similar works at Chichester and who concentrated his study on the central tower and its abutments at the York Minster, wrote, "At my inspection of the Minster I was impressed by the widespread pattern of settlements which extend throughout the arcades and by the appreciable disturbance in the masonry, both at the abutments to the central tower and in the structure of the lantern.

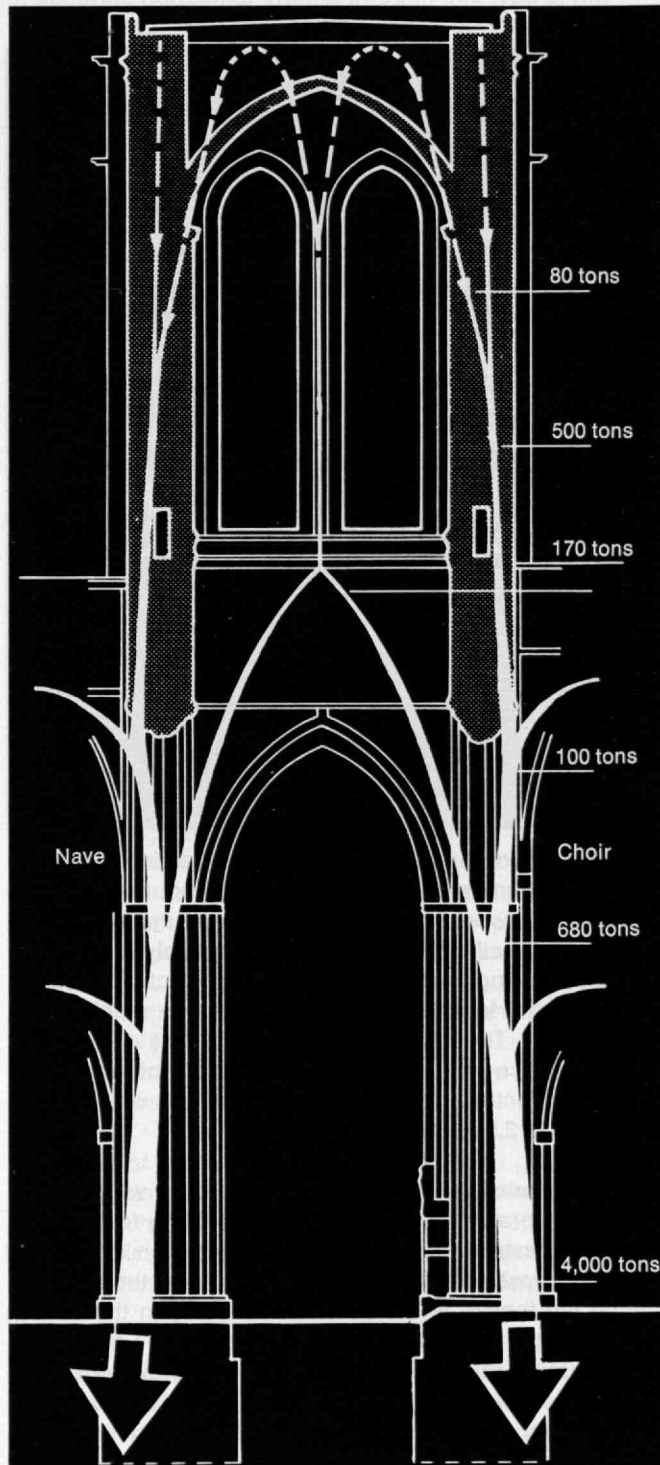
"The architectural pattern and scale of the present Minster which evolved from the building of the south transept in the thirteenth century and which set the module for the nave and the rebuilding of the eastern arm are direct and uncomplicated; the materials and craftsmanship are of the finest. Had the foundations rested upon a compact gravel as at Salisbury I am confident that there would have been no cause for concern for its behavior today, even after the addition of the tall lantern.

"I think it is of importance to note that the central spaces were completed with wooden vaults, indicating without doubt that the master masons were apprehensive of the behavior of the foundations and of the potential danger in poising heavy masonry vaults upon the arcades. . . . The nature of the settlements in the fabric demonstrate that the subsoil has proved inadequate to support in a level plane the present structure, with the result that uneven settlement has tended to separate the structural elements in the planes of greatest weakness; this is true both in the arcades of nave, choir, and transepts as it is throughout the height of the tower itself.

"The pattern of settlements in the tower indicates an outward movement of the walls at parapet level; the masonry spandrels over the great arches have sheared on the oblique line of thrust, and in the transepts horizontal movement outwards has occurred at the abutments. . . . The appreciable extent to which the lantern and its supporting piers have settled is evidenced at the abutments, at both triforium and clerestory levels—a sinkage of more than six inches. The total settlement in the foundations cannot be estimated but evidence of shearing has been revealed.

"It has taken several centuries for the movement within the structure to develop to its present stage, and from

Following construction of a three-dimensional model, the engineers studying the York Minster harnessed their computer to an analysis of forces in the central tower. The points are apparent: The loads on the foundations are eccentric and the thrust is on the outside, just where the foundations are smallest. In fact, this eccentric loading has produced pressures of 8 tons per square foot, which is somewhat excessive for the soil it is resting upon. And there is a substantial horizontal force in the middle of the tower which, being unrestrained, has led to severe cracking and movement.



a visual inspection of some of the settlements it would appear certain that this movement is continuing. . . . The excavations at the base of the northeast pier reveal that the fifteenth-century casings which rise above the present floor level, which were executed under the direction of William Colechester following the fall of the belfry, rest upon the work of at least two successive periods. At the lowest level exposed to a depth of approximately 10 feet below that of the nave, the stones were found to be embedded to a mortar of good quality and containing ash, an ingredient to improve the setting of the lime following the Roman and early Saxon practice of the use of ground tile for this purpose. It was interesting to discover Roman tile creasing used in the northern arm for the reinforcement of the masonry.

"The masonry above this level is constructed in a mortar of poor quality with very little lime and free of ash. The quality of building of the central tower was of this standard—here lies a good reason for its collapse. The fifteenth-century masonry, however, is work of the highest quality and is embedded in a rich lime mortar made with a very fine sand.

"From the foregoing I am in no doubt as to the cause of the behavior of the building, which can be attributed either directly or indirectly to its foundations. In the absence of an accurate record of movements in the structure, I am unable to predict the period when a continuance of the present movement will lead to eventual collapse. I am, however, convinced that the stage has been reached when effective measures should be taken to reinforce and integrate the structure to prevent its collapse and substantially improve the bearing ability of the foundations to the piers of the central and western towers."

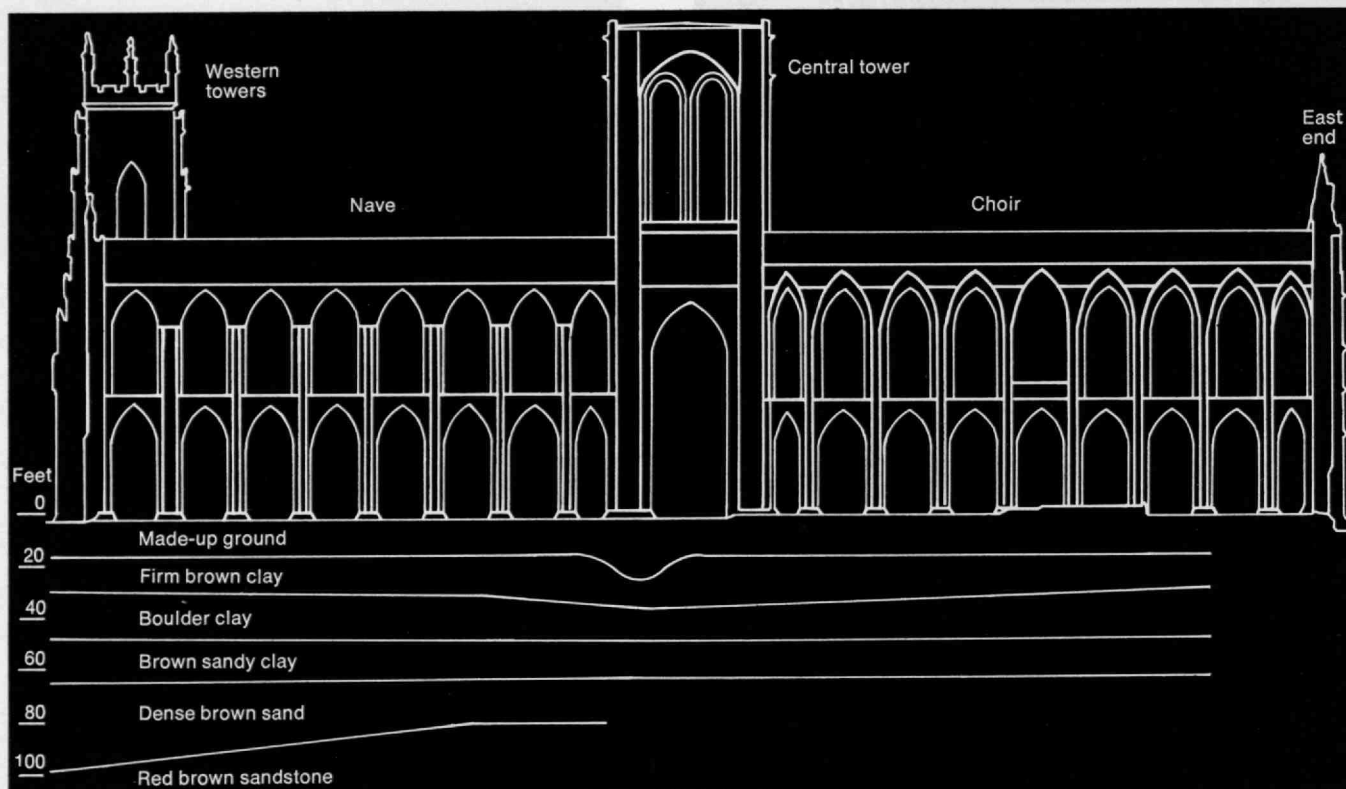
The Minster may well be a classic case of settlement—not many modern buildings could tolerate 9 to 12 inches!

#### The Central Tower Foundation Scheme

Some ten alternative schemes were considered for strengthening the central tower, which was given first priority because of the large weights involved and because of the virtual impossibility of holding these weights aloft on any temporary structures in a reasonable time. The great weight of the central tower is carried mostly by the four main piers, each of them bearing



The internal length of York Minster from east to west is 486 feet, and the nave (opposite page) is 104 feet wide. Though earlier buildings occupied the site, the entire structure as it stands today—excepting only the towers—was built between 1245, when the north transept was begun, and 1425, when the last of two sections of the choir were finished. Whether for reasons of cost or the builders' timidity, the vaulting of the building is of wood—in contrast to most large English churches of the period. (Photograph opposite: Herbert Felton from the Royal Commission on Historical Monuments (England); Crown copyright)



a vertical load of about 3,850 tons at floor level; the smaller columns adjacent carry about 300 tons each.

The exploratory excavations had revealed that the columns were built on the remnants of the walls of the previous Romanesque-style Minster (c. 1070 A.D.), in turn supported by strip footings, the tops of which were about 6 feet below the present floor. The Norman footings were either 12.5 or 21 feet wide and about 7 feet thick, apparently having been well founded on the virgin clay or on the very deeply founded Roman footings. It was now desired to make the effective foundation area about twice what it had been, as well as to stabilize the cracked areas. Because the main pier load was so extremely high and the masonry in rather delicate condition, it was necessary to find a method of strengthening which would incur the least disturbance to the existing footings.

After studying various strengthening schemes, it was finally decided to encase the Norman footings in con-

crete, incorporating the pier and the adjacent nave and transept columns on one huge footing about 48 feet square. This would utilize all the cracked masonry footings as well as provide some completely new areas of footing in concrete. The total effect would be to spread the load from the columns over a much larger area of clay. The new average bearing pressure on the clay would be about 2.7 tons per square foot, improving the safety factor against shear failure in the clay from about 1.3 to 2.5.

The new concrete and the ancient masonry were to be unified by prestressing them together, using four layers of main prestressing rods, two layers in each orthogonal direction passing right under the main pier, thus providing the tensile reinforcement necessary in the bottom of this large spread footing. As the new areas of concrete footing initially would support only their own weight, it would be necessary to artificially induce their full load capacity. For this purpose "compression pads" were to be cast below the main foundations. Because the

whole strengthening work clearly had to be a once-for-all conservation operation with a life expectancy of hundreds of years, it was decided to make the prestressing hardware of stainless steel.

Right from the outset it was obvious that the success of the whole foundation proposal depended on the success with which was conducted the drilling operation for these prestressing rods. The drill shots varied in length from 21 to 50 feet through eleventh-century masonry of doubtful quality; the required drilling accuracy was determined by the requirement that the alternate layers of rods be only 9 inches apart vertically. Although the contractor had had wide experience in rock drilling, no one had any knowledge of the problems of accurate horizontal drilling through this type of material. An accuracy of 1 inch off line in 50 feet is easily achieved in a homogeneous medium such as solid rock or good concrete, but this is not so in ancient masonry.

Some preliminary drill shots carried out before concreting had begun were encouraging, but the rotary-percussive tungsten-tipped pneumatic drill first used proved to be too inaccurate, at least under the northwest pier. The chief factors contributing to this were the poor mortar in the eleventh-century masonry due to a very low lime content, the fragmented nature of the masonry actually under the piers, and the presence of a grid of large oak baulks used by the Norman masons to reinforce their footings. The attempt to solidify the masonry by preliminary grouting had not been as beneficial as desired.

Success with the drilling was finally achieved using a diamond-studded coring drill with only rotary and no percussive action. At the time this article is written there remains much drilling to be done, and further improvements may still be effected. But the work to date makes clear that the major problems have been resolved.

### **The Central Tower Superstructure**

The lines of thrust in the central tower as calculated by the consulting engineers showed the reasons for a series of large and active cracks round the center of the tower. The plan for stabilizing the tower called for girdling it on each side with 12 stainless steel rods threaded in short lengths, joined with couplers, and anchored and prestressed in the same manner as the rods in the foundations. The drilling was achieved horizontally through 68 feet of masonry, which was found to be rather decayed internally in places and had to be grouted before drilling could proceed with sufficient accuracy.

At the top of the tower some 200 feet above ground the old oak beams were found riddled with death-watch beetle and had to be renewed. They were replaced with a steel lattice beam, and the lead roof was renewed with 10-pound case lead according to the English practice.

All this work has so far required about two years, and during this time the public have had free access to the Minster. Work has gone on below in the foundations and above at two levels in the tower.



### The Western Towers and Other Portions

As scaffolding was already in position for renewal of the pinnacles on the northwest tower, the superstructure was strengthened by grouting using a mixture of cement and pulverized fly ash, in combination with three sets of stainless steel reinforcement rods drilled through some 44 feet of masonry and anchored and prestressed in the same way as the central tower.

It is remarkable to note that the amount of grout received was about 1/40th of the total masonry in the tower; and some large voids of about 50 gallons capacity were found. The question must be asked as to how such large voids can occur in solidly built masonry. Two answers are suggested: dust may trickle out of the cracks, and rain may penetrate the outer joints and erode the interior, just as limestone caves form underground.

Currently the foundations of the west end are being dug by a team of archeologists. Soon the contractors will take the site over and strengthen the foundations in the same way as those of the central tower.

The east end of the Minster also showed signs of active movement which gave concern in 1967. Excavation showed very poor foundations. Computer analysis showed that the line of thrust was perilously close to the edge of the foundations so it was decided immediately to shore the whole wall against collapse.

The shoring, which is large and impressive in itself, has a special compensatory feature in the form of constant pressure flat jacks, and in practice these maintain the horizontal thrust at a predetermined figure of 20 tons  $\pm 1$  per cent. With the wall secured by shoring, conventional new foundations were inserted by taking out short lengths of existing footings and casting reinforced concrete to form a mass 125 feet long, 18 feet wide, and 9 feet thick, some 5 feet deeper than the existing footings.

### The Cathedral as Patient

The architect's role in this project to save the great York Minster is a little unusual, like the job itself. The Dean and Chapter regard themselves as the trustees of this great ecumenical church, and the Surveyor of the Fabric, as their officer, has an additional role in holding press conferences at about two-month intervals and providing information for fund-raising activities. In an-

other role he had to strike a balance between the imponderables of a full-scale exploration, obtaining agreement on design decisions, and keeping a large and urgent contract moving at a reasonable tempo. The architectural role has more similarity to that of a conductor trying to reinterpret a historical masterpiece than that of a composer of a new score.

One fascination was to see how the engineers helped the archeologists and how the latter illuminated the practical problems of restoration. Without their advice that such-and-such masonry was of such-and-such a date and therefore laid down before something else, much structural evidence of distortions and settlements could have been misread. Dare I say it, but I think engineering thinking has changed considerably due to this exposure to history. It now seems less positive and more willing to consider analogy.

The first rule for anyone considering restoring an ancient structure is how to make best use of the material there. One can argue that the building has stood 500 years in spite of the calculations, and by conserving the existing fabric and augmenting it one must be able to make it a bit better. One can also exploit the inherent synergy of the structure.

As noted by Poul Beckmann, of Ove Arup and Partners, consulting engineers for the York Minster restoration, "Our work at York Minster is not an intellectual *tour de force*, nor will it be spectacular when it is finished; but it is nevertheless engineering. What makes it particularly interesting is that the problems are four-dimensional. Time enters into the technical arguments very much, and we cannot begin to understand what has happened to the structure without studying its history."

The essence of an approach to the problems of repairing a building such as York Minster is humility and an appreciation that some of the factors one is dealing with are unknown and may be unknowable. Repair work should, if possible, be invisible. Credit must be given to the structure for its past performance, and it is better to knit together and strengthen—using what is there to the best advantage—than to replace entirely with a new and nicely calculated structure which may not graft successfully and which may in fact be rejected. The metaphors of surgery are apt; a historic building has a past and also has a future, and it should be treated like a



*This twelfth-century stone carving—Hell's Cauldron, showing the devils pushing the souls of the damned into hell—was found buried in the garden of the York Minster and thus was preserved from the ravages of time and change. It may have been on the west facade of the third minster to occupy the site on which today's great church stands. (Photograph: collection of Lester B. Bridaham)*



living thing. The Surveyor of the Fabric and engineers and builders have in fact formed an operating team to tackle the problem of repairing the failing foundations of the Minster. In a sense the work is a form of building surgery, and the patient simply must be kept alive. The first question must be, "Is the patient strong enough to stand the necessary treatment?"

As this is written, late in the summer of 1970, the major works on the new foundations of the Minster are just over half complete. It is hoped to finish in 1972, in time for the celebration of the 500th year of the completion

of the Minster. A multidisciplinary team of engineers, architects, archeologists, and other consultants has been working together with the greatest basic harmony. Any necessary disagreements have been resolved creatively for the benefit of the works. Certainly the archeologists have benefited from their exposure to a problem with so many engineering constraints over a time scale of centuries which challenges one's normal assumptions. And I have already traced how the engineers' thinking has been affected by this exposure to understanding an ancient structure and how to deal with its afflictions.

Working on such a restoration, one is up against so many unknowns that one has to work by analogy based on experience. If you want a positive proof of any theory, you might have to wait until the building has fallen down.

*Bernard M. Feilden, who is the Surveyor of the Fabric of the great York Minster, is Senior Partner in the architectural firm of Feilden and Mawson of Norwich, England. The consulting engineers for the project described in this article are Ove Arup and Partners of London, and the contractor is Shepherd Construction, Ltd., of York, England. The work of restoring the church is supported by the York Minster Fund, to which the author has pledged the honorarium associated with preparation of this article. Details of the Fund are available from the Secretary, 9, Precentor's Court, York, England; arrangements are now being completed for Americans to make tax-deductible gifts to British cathedrals and churches through the Historic Churches Preservation Fund, Inc., c/o Barclay's Bank, 300 Park Ave., New York, N.Y., 10022.*

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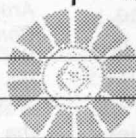
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All these were in the 1969-70 issues of Technology Review, the new national magazine edited at the Massachusetts Institute of Technology. So were a major report on nuclear-powered aircraft design, an in-depth study of the world protein problem, the case against the growth economy, the reason why industrialized building never gets started, an explanation of how the new urban transit systems are worse than the old ones. Also nine columns by Robert C. Cowen of the Christian Science Monitor and Victor Cohn of the Washington Post... book reviews... puzzles and games. Your friends could have had all this — and more — if you'd thought to give them Technology Review for Christmas in 1969. Don't make the same mistake again. Use the coupon.

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# Trend of Affairs

## Insurance— of Inefficiency

A modest bit of surgery might cost you a modest \$1,500 a week while you're in the hospital. But Blue Cross pays most of it anyway, so why query the cost? Your medical insurance rates went up again a few months ago, but, well, you want the best money can buy. Like anything else, the more you spend, the more you get.

Perhaps. It might just be possible to deflect the forward thrust of medical costs—if Blue Cross didn't take care of it so tidily. If you paid more of the bill, you might shop around a bit for the best buy. And introducing a modest bit of competition among hospitals might prod them into efficiency.

So suspect Joseph Newhouse and Vincent Taylor of the RAND Corporation. They compare present health insurance with subsidized automobile purchasing: if every car cost the consumer only \$100, most would take Cadillacs. Naturally it costs more to produce a Cadillac than a Volkswagen, but the government would pay for it from taxes. More and more of our resources would go into building Cadillacs, but each of us would feel it only indirectly—lesser amounts of other goods and services available. There would be no particular incentive not to take a Cadillac. Since we do not bear the direct cost of medical care, they say, we ask for the most expensive and/or the best. This may not be what we really want, when the cost is counted, but present insurance systems do not give us the choice.

Mr. Newhouse and Mr. Taylor therefore suggest variable-cost insurance (V.C.I.). Different sized premiums would secure different expense-classes of service.

Each hospital in an area would be assigned an expense class, depending on the luxuriousness of its facilities and the levels of its past billing. When an individual bought insurance, he would, in consultation with his physician, select a hospital and pay a premium according to its class. When the time came to pay the bill for treatment, the patient choosing a higher-class hospital would derive less help from his insurance policy. Hospitals whose expense was not commensurate with their service would be less used.

The first argument against V.C.I. is that few people can have a choice of hospitals—some because there is only one in the area, or because one happens to be most convenient. But, Mr. Newhouse and Mr. Taylor say, choice is not necessary for V.C.I. to work. Those to whom a low-cost hospital was most convenient would no longer effectively subsidize those who habitually chose an expensive one. Each client would pay more directly for the service he received. And if even 10 per cent of an inefficient hospital's clients chose elsewhere, it would be pressured sufficiently to tighten up.

The physician would begin to watch the costs of his care, since more of it fell upon his patient, not the company. Of a number of possible treatments, he would choose the least expensive acceptable one, not the "best." The insured patient would take a consumer's interest in matters of relative quality and price—and perhaps generate enough pressure to encourage investigations of the precise reasons for the inflated costs of remaining healthy.

## War on Waste: Should We Bomb?

At the 160th National Meeting of the American Chemical Society, held in Chicago this September, some ingenious solutions to some topical problems were heard, particularly in the Division of Water, Air and Waste Chemistry.

Charles W. Lee, of Uniroyal's Wayne, N.J., Research Center, has hit on a method of removing sulfur dioxide from flue gases which, as chemistry, is extraordinarily elegant. The gases are passed over a moving belt of a textile made from polypropylene and a particular polymeric amine. At temperatures below 100°C. this amine absorbs SO<sub>2</sub> from a typical flue-gas mixture (in which it is present at concentrations below 1 per cent) while remaining quite unaffected by the other gases present. At 100°C., it regenerates the SO<sub>2</sub>. The only side reaction is the production on the fibre of a thermally stable bisulfate, which can be removed by alkali treatment.

Thus, one can visualize a moving band of this polymer fiber, woven so as to have any desired mechanical prop-



erties, passing back and forth between a smokestack and a regeneration chamber. An indefinitely high percentage of the sulfur dioxide in the stack gas could be removed and converted to sulfuric acid. At present, there are just two obstacles: the price, and the necessity of cooling the stack gas to less than 100°C. But the chemistry is admirable in its unique directness.

The Division heard a different kind of directness from David R. Safrany, of the Bechtel Corporation's laboratory at Belmont, Calif. In a study of "all current and envisioned methods for fixing atmospheric nitrogen," Mr. Safrany had concluded that there was nothing to compete with the Haber process, whose only shortcoming was the price of hydrogen. Whence, then, cheaper hydrogen?

Organic waste materials, whether wood, rubber, sewage or whatever, contain hydrogen, carbon, and oxygen in a fairly constant ratio. Mr. Safrany and his colleagues calculate that if these elements were brought to thermodynamic equilibrium by vaporization with a thermonuclear device, the resulting hydrogen would cost only half a cent a pound, against the 6 or 7 cents a pound which it costs at present.

The process would use two hydrogen bombs: one to create an underground cavity, in which a few million tons of solid wastes would be contained while they were vaporized by the second. For all organic wastes, the products would be hydrogen and carbon monoxide (the equilibrium species at 2,000°C.—there would be no further chemical changes as the mixture cooled). The hydrogen would be radioactive, but the carbon monoxide would not. Ammonia made from the hydrogen would therefore not be sold, but would be used as a source of other nitrogen compounds in closed chemical plants where the tritiated hydrogen would be recycled. The carbon monoxide would be reacted with water, to produce ordinary hydrogen.

## ... Or Biodegrade?

To Mr. Safrany, this approach was not only practicable (given a public willingness to transport organic wastes to suitable sites for bombing) but aesthetically appealing: vaporization of organic material would "liberate the stored solar energy in a form suitable for performing subsequent useful work." To V. R. Srinivasan of Louisiana State University's microbiology department, on the other hand, bombing organic materials is "very wrong." They must be recycled as organics. The high organization characteristic of the stuff of life is too precious to throw away.

Dr. Srinivasan is best known for his work on sugar cane wastes. A pilot plant has now been constructed (at what was once N.A.S.A.'s Mississippi Test Facility) for the two-stage fermentation of sugar-cane cellulose into a product similar in its amino-acid composition to soybean protein. At the American Chemical Society Meeting, Dr. Srinivasan told the Division of Water, Air and Waste Chemistry his thoughts on the biodegradation also of *synthetic* polymers.

In nature, polymers are generally broken down by enzymes synthesized by microorganisms. The latter are assisted to some extent by nonbiological reactions, such as oxidations stimulated by sunlight or catalyzed by heavy metals. If we wish our man-made polymers to be subject to decay processes which will ultimately feed them into the natural food chains, we have two complementary strategies: breed microorganisms specifically for the task; and design the polymers so that they are somewhat more vulnerable than at present—for instance, so that free radicals appear within the polymer when it is irradiated.

In the breeding of microorganisms, says Dr. Srinivasan, we have barely scratched the surface (unlike the situation of animal and plant breeding). Promising strains are available in the effluents from the facilities where the polymers are made and processed. In the last year, Dr. Srinivasan has begun work on organisms which can attack chlorinated polymers.

As a footnote, one very general question: is there a place for chemistry in the treatment of solid wastes? One would have thought so, from first principles. And yet, "when a task force of the American Chemical Society attempted to establish a committee of experts on the chemistry of solid waste management, none could be found," according to Union Carbide's Dr. L. M. Cooke, who is a director of A.C.S. The quotation is from the abstracts book of the meeting; Dr. Cooke had undertaken to present a paper to the "Water" Division on the role of chemistry in current solid waste management practices and the possible future uses of chemistry in improving the properties of our unwanted solids. The A.C.S. press officer, sensing correctly that this was an important theme, requested advance information on the contents of Dr. Cooke's paper. Sadly, Dr. Cooke replied that he had been able to find little or no useful data on the subject, and suggested that "The Role of Chemistry in Solid Waste Management" be quietly forgotten as a newsworthy item.

## Down with DNA

As a high-protein food for human beings, single-cell organisms such as yeast have one inherent fault: an excessive proportion of the protein is in the form of



nucleic acids. The limited ability of the human digestive enzymes to break down nucleic acids into useful products results in the accumulation of uric acid—a gouty condition—in people who have tried, experimentally, to derive all their protein intake from yeasts.

The yeast-protein project at M.I.T.'s Department of Nutrition and Food Science has now taken the matter one step further, by devising a process for removing much of the nucleic acid from a yeast culture.

The yeast is grown by continuous fermentation under steady conditions of temperature and concentration. The output from the fermentation vessel passes through three successive stages. First, a brief temperature shock of 68°C. for around four seconds; next, the flowing yeast-suspension spends an hour at 45°; finally, it is heated to 55°. Each of these temperatures is the best for a different stage in the destruction of nucleic acids and the loss of their breakdown products from the cell.

The temperature shock apparently activates an enzyme which catalyzes the hydrolysis of nucleic acids. The first "incubation" stage which follows enables this hydrolysis to proceed; the result is a suspension of cells which still contain the debris of the nucleic acids, and the final, higher-temperature, incubation has the effect of increasing the permeability of the cell walls so that these products can escape into solution. When the liquid is filtered, the extracted cells are an improvement over raw yeast cells not only in protein composition but also in taste—neutral rather than unpleasant. Using the yeast *candida utilis*, Dr. Anthony J. Sinskey and his colleagues have produced a food containing 50 per cent protein but less than 1 per cent nucleic acid. Dr. Sinskey described the M.I.T. process at the National Meeting of the American Chemical Society in Chicago this September.

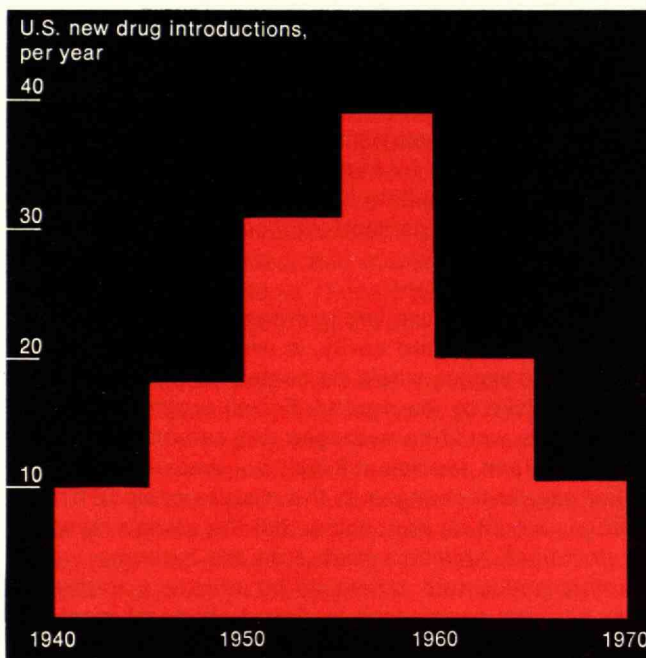
## Drugs: Has the Age of Miracles Passed?

Concluding a symposium on the science of drug discovery at the American Chemical Society's National Meeting this fall, Barry M. Bloom of Pfizer's Groton, Conn., laboratories presented the figures upon which is based the accompanying graph. He had attempted to document the widespread impression that the rate of discovery of new drugs is diminishing. As data, he used the introductions of new drugs on to the American market, since any material improvement, no matter where in the world it is discovered, is fairly certain to be quickly exploited in the U.S.—or so one might expect.

Other versions of these figures are slightly different, but only slightly (for example, the number of "new entities" introduced in 1969 is generally counted as nine, whereas Mr. Bloom makes it seven). The general pattern is unquestioned. But there is some question as to what it means.

In 1962 the Food, Drug and Cosmetic Act was

*The rise and fall of the number of new drugs appearing each year on the U.S. market. Research and development costs per drug introduced have risen by a factor of about six in the last ten years.*



amended to require that any new drug should be not only safe but efficacious. Since 1962, Mr. Bloom finds, there has been a marked tendency for new drugs to be either antibiotics, cancer treatments, or neural agents, to the neglect of the general run of diseases. In his view, discovery goes on very much as it used to, but the only drugs that reach the U.S. market are those for which an efficacy demonstration is relatively easy.

Of course, one can look at it the other way, as one questioner did: were not many of the pre-1962 drugs merely minor modifications, of no significant novelty? What kind of figures would remain if only the truly useful innovations were included in the analysis? Mr. Bloom said that he thought that his main thesis would survive, although he could not prove it.

His main thesis was that the 1962 regulation was being interpreted in such a way as to stifle the productivity of the industry. The Food and Drug Administration was behaving as if the 1962 legislation permitted judgement on the basis of *comparative* efficacy, which—as Mr. C. J. Cavallito, of Ayerst Laboratories, New York, averred—it certainly did not.

A little arithmetic applied to the figures in the bar-chart



and the research expenditures of the drug companies leads to the conclusion that it now costs about six times as much to discover a new drug, saleable in the U.S., as it did ten years ago. (Francis J. Blee, of Drexel Harriman Ripley, Philadelphia, produced the following figures: research and development investment per "new entity" between 1956 and 1962—\$4.1 million; between 1963 and 1969, \$23.1 million.) There is therefore a keen interest in the question of which methods of finding drugs are likely to work.

## ... and Will That of Science Ever Dawn?

Finding new drugs is a form of professional gambling: some people think they have a system. William P. Purcell of the University of Tennessee holds that "from a philosophical point of view, one can reason that if we have the resources, such as manpower, knowledge, sophisticated instrumentation, computers, etc., to bring a successful 'moon walk' to fruition, one would anticipate that a molecule could be tailor made to be effective against a specific disease."

Dr. Purcell is for designing drugs for specific purposes, applying computers to the correlation of biological activity with chemical structure. He admitted, though, that "one knows more about the molecular structure of an isolated molecule from instrumental analyses than about the specific interaction of this molecule with a complicated biological system . . . The level of sophistication of handling simultaneous equations is greater than the understanding of a parameter from pharmacological testing."

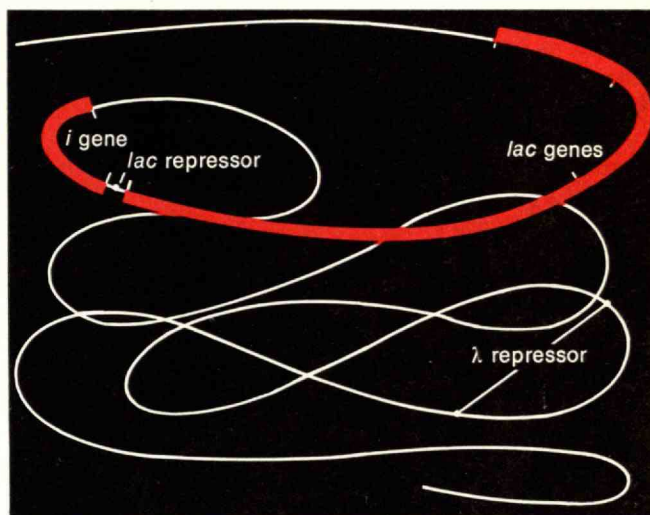
John J. Burns, of Hoffman-La Roche, Nutley, N.J., spoke of a related shortcoming which he called the "biological knowledge gap": a lack of basic understanding of disease processes and of what drugs actually do. For finding new drugs, the random synthesis of compounds, followed by screening for biological activity, is still worthwhile, as long as the biologists are good ones, and as long as they talk to the chemists.

Asked what percentage of real drug discoveries result from random synthesis, J. H. Biel of Abbott Laboratories cited one study in which it had appeared that, of 10,000 compounds generated at random, three had proved useful; whereas in mission-oriented research, the proportion was one in a thousand. Someone in the audience objected that it depended what you called a separate compound, and that such statistics could therefore be stretched. Dr. S. Morris Kupchan, of the University of Virginia, favored the screening of, instead, randomly chosen plant extracts (which might at any rate result in some saving on the salaries of rank-and-file chemists).

Mr. Cavallito thought that the factor that had changed least over the years was the need for unique, perceptive individuals. What we are looking for, he said, is ways of improving our chances of being lucky. He warned

*Repressors—the molecules that turn genes on and off—have been isolated, and the first bits of information about their nature have begun to be found.*

*The chart shows the relationship of a repressor gene, the *i* gene, to the group of genes which direct the manufacture of beta-galactosidase. The *lac* repressor, which is about twice as wide as the chromosome itself, binds at the beginning of the sequence to the operator, which is about 12 bases long. This chromosome is a special one: it contains *lambda* genes as well as *lac* genes, and the position of the *lambda* repressor is shown across a lower loop of the molecule where the *lambda* genes are located. (Chart: Scientific American)*



against the tendency to give credit to likely-sounding myths as to which methods were successful. If the stories of the drug discoveries of the past were told truthfully—a task that seems not to have been attempted—it would be found that luck played a bigger part than the discoverers like to pretend. The danger was that young researchers, believing the tales of successful methods of research, would grow discouraged when they tried these vaunted methods, and failed.

## A Natural Repression

Some tens of thousands of genes exist in each cell of the human body, each perfectly precise in its function and precisely timed. They direct the incredibly complex evolving of one cell into a full organism—the rate of growth, the differentiation of tissue, and the cessation of growth. They accomplish whatever adaptation to a changing environment occurs.

But how do they know when their turns have come to order the making of their particular protein? And when to stop?

Nine years ago, François Jacob and Jacques Monod of the Pasteur Institute proposed a theory of gene repressors: molecules, probably protein, which locked onto an area at the beginning of a gene, called the operator site, and prevented the gene's being tran-



scribed. (A gene is copied in messenger-RNA which carries its orders to small bodies in the cell called ribosomes. The ribosomes make proteins "to go" from free-floating molecules).

Jacob and Monod also detailed one gene-and-repressor team, the *lac* system of the bacterium *Escherichia coli*. It controls *E. coli*'s use of lactose, a milk sugar. Two kinds of genes cooperate to break down lactose, one to regulate the quantity of the enzyme beta-galactosidase, which divides the sugar into usable parts, and one to determine its structure. The first gene negatively controls the second: it makes a repressor which binds the latter unless another molecule, called an inducer, binds the repressor first. Thus if lactose is present, bits of it tie up the repressor, and the beta-galactosidase gene is free to make its enzyme.

The theory had some experimental support; however, the repressors themselves had to be isolated and analyzed before many questions could be answered. And this has now been done, for the *lac* repressor and a few other simple ones. Mark Ptashne and Walter Gilbert at Harvard report their success in the June *Scientific American*.

Gilbert hoped to find the *lac* repressor by binding it to a radioactively marked inducer. He submerged a cellulose bag holding a concentration of *E. coli* proteins in a solution of the labelled inducer. Since the inducer could easily pass through the bag, the free inducer would reach equilibrium inside the bag and out. The larger proteins, however, could not pass through the cellulose, and the inducer bound to them would also be trapped. If the repressor was present to bind the inducer, he reasoned, the fluid inside the bag would show more radioactivity than that outside. It did, and he was then able to separate the inducer/repressor combination.

Ptashne worked with a different repressor, one found in a virus called phage lambda which attacks *E. coli*. The phage lambda subverts a bacterium into forming more viruses, or it attaches its DNA onto that of the cell, to be reproduced in following generations. An active repressor dictates the second strategy—and all of the new cells can be made into viruses once the repressor is lifted. (In the latter action, the viral DNA is called a provirus).

He managed to make an *E. coli* cell in which the native DNA was inactivated—it could no longer direct the making of protein. The cell-building equipment remained intact. Into this bacterium he introduced a virus which could order protein to be made, but only one type—the repressor. By feeding the pair only radioactive amino acids, he obtained a supply of marked repressor.

Both repressors, and the few others since found, are large proteins. The *lac* repressor has four units with a molecular weight of 38,000 each; the lambda has four units of 28,000 each. Both are weakly acidic. Both also are quite ordinary proteins, bearing no structural resemblance to the genetic material. The repressors contain strong positive areas which bind to phosphates on the DNA chain, although how they recognize which pattern of these molecules is their operator site is still unknown. Their action is apparently quite specific.

## Unnatural Aggression and Devious Defense

RNA, a cellular servant, is found to have the status of his assumed master, DNA, the master now does his bidding, and around that micro-revolution is revolving a greater one for the field of molecular biology. The revolution's seven-year prophet is restored to public faith, and its successful conclusion will help protect the body from foreign invasion—by cancer.

The reigning tenet of cellular information transfer for years has been that DNA (a long string of genes which stores information from generation to generation) simply ordered a copy to be made of itself, or part of itself, in RNA, a nearly identical protein, and then told the RNA to direct the fulfillment of its orders. But a few tumor-causing viruses contain no DNA to initiate those events. Startlingly, these viruses hold only RNA as their genetic material.

When the RNA tumor viruses infect a cell (with the same results as described in the story above), how then is their information carried? In 1963, Dr. Howard Temin, of Wisconsin's McArdle Laboratory for Cancer Research, suggested that the viral RNA orders the production of a matching DNA, which then performs the transfer. His evidence was indirect and circumstantial; the response was skeptical. Last May, he presented what looks to be undeniable proof, and he has been corroborated independently by Dr. David Baltimore of M.I.T. and Dr. Sol Spiegelman of Columbia. (Dr. Temin and his co-worker, Dr. Satoshi Mizutani, spoke at the Tenth International Cancer Conference last May in Houston; Dr. Baltimore at a Tumor Virus Meeting in Cold Spring Harbor last June. Both are published in *Nature*, vol. 226, pp. 1209-1213.)

Each man has found a new enzyme, DNA polymerase (which directs the making of DNA), present in the cells infected by the RNA tumor viruses they studied. Dr. Temin, using Rous sarcoma virus (which causes a par-



ticular type of tumor in fowl) found that the enzyme could manufacture a specific DNA, according to the RNA template, from a supply of the four "letters" of the DNA language. These "letters," four bases attached to deoxynucleoside triphosphates, by their differing orders give specific parts of the DNA molecule its specific characteristics.

Dr. Baltimore added support by showing that the enzyme, if supplied with ribonucleoside triphosphates, the corresponding elements of RNA, will *not* make RNA. Moreover, the enzyme can be inhibited by ribonuclease, another enzyme which breaks down RNA. Both scientists conclude that DNA polymerase is dependent on RNA for its orders. Dr. Baltimore further believes that the enzyme probably exists in all RNA tumor viruses.

Given that the virus makes DNA when it infects *E. coli*, what does this DNA do? Does it, for instance, pair with its parent RNA to make a double helix, as ordinary DNA does with other DNA? This might then be capable of behaving in the host cell as the DNA of ordinary viruses—ordering copies of itself made in RNA to take over the cell. Would this hybrid use the host's command mechanism or make and impose its own enzymes?

Does the new DNA fit itself into the host's own DNA, to be reproduced along with it in succeeding generations of cells, as does the phage lambda provirus (see above story)? Once these questions are answered, a compound might be found that would not interfere with the cell's operations but would suppress making of the virus's DNA messenger or DNA polymerase and thus prevent the course of the infection—and the growth of the malignancy.

Research by Dr. Temin and Dr. Mizutani over the summer has found two more enzymes in a mouse sarcoma virus—they suspect one of attaching the DNA to the cell's chromosomes, and one of enabling a DNA-RNA hybrid helix—which support the provirus theory. A number of other scientists have begun their own studies, and more answers should be coming.

## The YOPHU's and the Millions

"We're going to get our transit legislation!! Does everybody agree?!" The speaker led his audience in clapping and cheers. He was right. The U.S. Senate and the House of Representatives have agreed to give \$3.1 billion over five years, with the promise of \$6.9 billion more over the next seven, to improve urban transportation. (The total \$10 billion over 12 years has been authorized but not yet appropriated.)

"The priorities have changed; needs have changed; our program has changed." The American Transit Association, meeting in Boston this fall, heard the news from the man to know, Carlos Villarreal, administrator of the Urban Mass Transportation Administration (U.M.T.A.).

From the new transit bill signed by the President this fall, about \$80 million will be available next year to improve urban mass transit—less than the administration will spend in that time on the S.S.T. and far less than the \$70 billion cost of the interstate highway system. The Department of Transportation already has some interesting and unusual plans for its new funds. (Cartoon: LePelley in the Christian Science Monitor ©TCSPS)



Mr. Villarreal enthusiastically described the new program to fit the new money.

Much of the old will remain. The sometimes faithful city bus system will be saved; it will continue to be coaxed from despair by grants for new and better equipment. It will have freeway and street lanes to itself, and it may have cleaner, steam, engines. It will be more convenient, built in different sizes and closer to the ground. It is on the bus that Mr. Villarreal places first emphasis.

His second priority seems to be rail rapid transit. A prototype car will be built and maintained by U.M.T.A., he said, incorporating all that is new in transit vehicles, for inspection and try-outs. Such a car will cost \$500,000 to \$1 million.

He named no other specific programs of support for rail rapid transit, but the future funding will presumably, as for buses, follow the pattern of the past. U.M.T.A. has put \$700 million over nine years into bus and rail systems. With this, 4,400 new buses have been bought, and



1,560 rail commuter cars, 950 rapid transit cars, and 65 miles of rapid transit rails. (San Francisco's BART alone has received over \$110 million, for a system that concentrates most of its rails and stations in the suburbs, not in the crowded city. Martin Wohl, director of transportation studies for The Urban Institute, asks in *Technology Review* for June, 1970, if BART will serve those who need city transportation—the young, old, poor, handicapped, and city workers.)

Yet U.M.T.A. will not spend all of its money in the old ways. As Mr. Villarreal phrased it, "We do intend to move forward with a vigorous and imaginative research, development, and demonstration program." But, he stressed repeatedly, "I feel a serious responsibility to spend the taxpayer's money wisely." He mentioned three specific programs:

1. A dial-a-bus system in Haddonfield, N.J., the development of which is expected to cost \$1.8 million. (But the contract cannot be signed until labor clearance has been gained.) Small, manually directed buses would feed suburban commuters into the Lindenwold Line, a privately financed rapid rail into Philadelphia. In 1968 H.U.D. recommended a computer-directed dial-a-bus for such moderate-density areas; and, although a computer-controlled system developed at M.I.T. (see *Technology Review* for October/November, 1970, p. 69) was lacking only \$700,000 for a demonstration, Mr. Villarreal said at a press conference that the manual system in Haddonfield was "more in the national interest."

2. A tracked air cushion vehicle (TACV)—based on a French development—to be built near Los Angeles. TACV cars, powered by linear induction motors, ride a guideway upon a thin cushion of air. The system will be built 20 feet above the San Diego freeway from the Sepulveda Dam in the suburban San Fernando Valley to the Los Angeles International Airport, with presumable city connections at its one intermediate stop. The TACV can make up to 150 mi./h.; probably it will not on the 19-mile run. Robert Cannon, Assistant Secretary for Systems Development in D.O.T., explained at a seminar later in the fall at M.I.T. that the Los Angeles TACV, which will cost \$50 million for the guideway, is a demonstration for a wished-for line from a proposed jetport at Palmdale, north of the city, to the airport or to San Diego. Unless costs go down, one surmises that the full 200-mile run would cost \$500 million, exclusive

of cars.

3. A test track for high-speed ground vehicles, like TACV, at Pueblo, Colo. For \$50 million, D.O.T. will buy two 20-mile oval tracks and one 20-mile straightaway.

A question turned Mr. Villarreal back to urban mass transportation, specifically what U.M.T.A. was doing to improve mobility in the inner city and especially to help core residents get to work. Mr. Villarreal replied that the subject "is near and dear to my heart." He added, "We have a code word for that problem: YOPHU. The young, old, physically handicapped, and unemployed. We've found that these people get the first or second paycheck and what do they do? They buy a car. Now that's interesting. So we're going to try and make public transportation more attractive." He explained rather extensively that an Environmental Improvement Program kit is available to cities: a catalytic muffler, a fuel injector, and other gadgets for buses and taxis to cut exhaust pollution. He repeated his plans to improve bus systems.

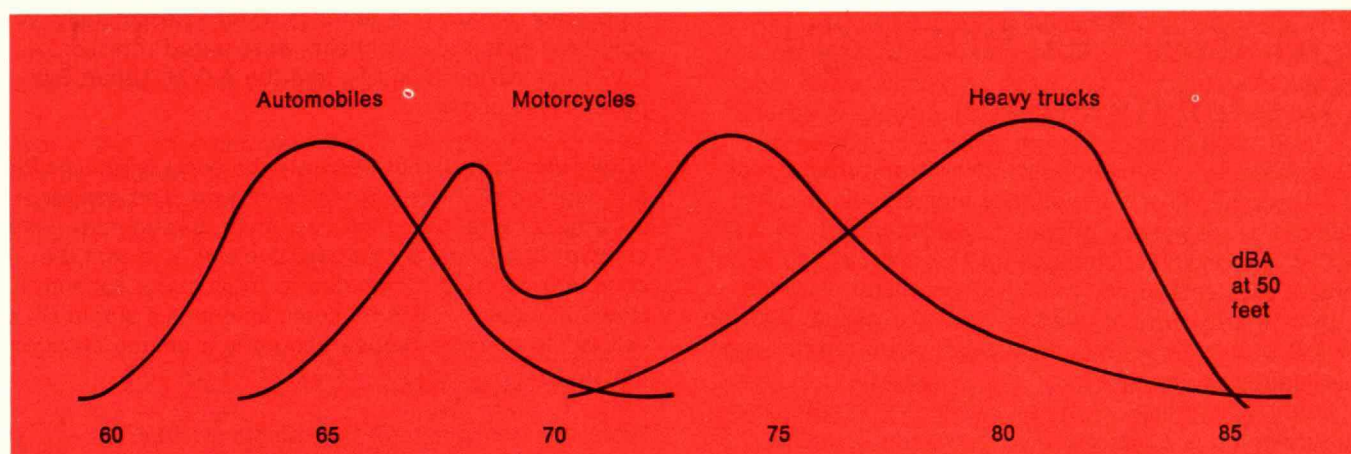
## Costing Urban Quiet

Though you may think of it only when a jet overhead interrupts your telephone conversation or a 14-wheel diesel truck wakes the baby, noise is a universal urban pollutant, and transportation is the largest single—and largely unnecessary—contributor. Indeed, today transportation "sets the noise levels in any urban area," says Leo L. Beranek, Chief Scientist of the Cambridge firm of Bolt, Beranek and Newman, Inc., summarizing a session of a symposium on transportation noise sponsored at the University of Washington last year by the Office of Noise Abatement in the Department of Transportation.

Except for the occasional peaks caused by noisy aircraft or vehicles passing your house, the background noise is constant in a major urban area—about 50 dBA in the daytime, 40 at night, according to studies made in the city of Ottawa, Canada, by George J. Thiessen of the Canadian National Research Council. Whether you are at the city center or in a residential neighborhood—except on the very outskirts—makes little or no difference.



*Transportation is the greatest single contributor to the general level of urban noise—and motor vehicles are the largest offenders—automobiles, motorcycles, and trucks, in ascending order. While the problems of testing and evaluation are severe, the engineering problems involved in reducing transportation noise are largely solved. We can expect whatever silence we are willing to pay for. The chart below shows the statistical distribution of sound pressure levels for various types of vehicles traveling between 30 and 39 mi./h. in Ottawa, Canada, as reported by George J. Thiessen of the Acoustics Laboratory, Applied Physics Division, National Research Council (Canada).*



But the peaks of noise, when a truck or subway train passes or an airplane flies overhead, are the major nuisance.

In a separate study for the Department of Transportation of seven urban "subway" systems throughout Europe, Erich K. Bender and Manfred Heckl of Bolt, Beranek and Newman confirm what everyone knows: their trains are major sources of noise. Many parts of train and track vibrate to radiate essentially uncorrelated sound. But there are significant variations, some of them surprising. Ballast in tracks can reduce noise levels up to 10 dBA. A rail joint adds 8 dBA to track noise, rough or flat wheels 10 dBA. Rubber-tired subways in Paris are 9 dBA quieter than steel-wheeled Paris equipment, while steel-wheeled subways in other systems are quieter than rubber-tired ones. But the potential gain from greater knowledge and greater effort is very clear: the difference between the noisiest and quietest subway stations studied by Messrs. Bender and Heckl in eight European cities is 22 dBA.

If you are standing 50 feet from an automobile traveling down the highway at a constant speed of 35 mi./h., the sound pressure level is likely to be between 60 and 65 dBA; for a motorcycle the pressure will be between 70 and 75 dBA, for a heavy truck at least 75 dBA, Dr. Thiessen reported at the University of Washington. If the passenger car is accelerating, its sound pressure level will be at least 10 dBA higher—and that of a truck may be as high as 90 dBA.

And herein lies the problem: how do you control the

test conditions carefully enough to make motor vehicle noise tests effective and regulations fair? Jack H. Venema of the Ford Motor Co. raised this question in its many details: the sound from a vehicle depends on its speed and mode of operation; on road conditions; on the vehicle's particular equipment (including both exhaust system and tires); and on the distance and angles of the listener. All these things considered, the noise from two apparently similar cars driven at the same speed down the same highway may vary by as much as 14 dBA, he said. Reporting efforts of the Vehicle Sound Level Committee of the Society of Automotive Engineers, Mr. Venema could only tell the University of Washington symposium that progress was being made toward the ultimate goal of "a simple test which will produce noise readings approaching the absolute maximum within a reasonable margin."

Dr. Beranek was less academic. Cadillac cars and Montreal's subway to the 1967 World's Fair prove that "transportation can be reasonably quiet," he said. The state of the art is entirely adequate. The buyer wants to have his automobile quiet—and it turns out that he is willing to pay the cost (including the cost of new-car tires especially designed and made to be quieter than the tires which will replace them after 25,000 miles) though its absolute amount may be unknown to him. But nobody is willing to pay for silencing trucks or subway trains, and motorcyclists (and perhaps truck drivers?) don't want to be quiet anyway.



risks, political troublemakers, petty criminals. But one can look at all these applications, said Dr. Bruck, "without finding a single reference to life styles, quality, or human behavior."

## ... The Myth of Rationality ...

But even if their bosses want them to, can computers really work for urban people—not just for the bosses?

Yes, if the tasks to which computers are assigned are simple, and if computers are seen as but "one set of tools among many in a process which is essentially political," Marvin L. Manheim, Associate Professor of Civil Engineering at M.I.T., told the A.C.M. Urban Symposium (*see above*).

"Computer-based analyses must be socially and politically sensitive," Professor Manheim said. The danger is reliance on what he called "the myth of rationality—the concept that there is one best decision and that the computer can find it. We tend to try to come out with a single number. . . . But no community has a single set of values; no one can reduce people to a unique criterion-function."

Professor Manheim took an example of this error—which he called "pernicious and dangerous"—from transportation planning. "We have had a process of abstract analysis as the basis of highway planning. But this has resulted in significant bias in the decisions made, because this analysis has been isolated from social and political life. How do you put a market price on the displacement of families, or jobs?" The highway engineer, because he has been the client and user of such analyses, said Professor Manheim, is now "not a respected professional but the personification of the evils of technology."

Professor Manheim's alternative is to let the computer bring data to *human* decision making, instead of hiding the issues behind optimization models. "Let the computer lay out the imponderables. Use our simulation models to help display alternatives to the community in a constructive political process."

"Only through the process of making decisions can people sense their values," he told the A.C.M.

## ... the Uses of Data ...

Or is this emphasis wrong? asked David A. Grossman, New York's Deputy Director of the Budget, responding to Professor Manheim (*see above*) at the A.C.M. Urban Symposium.

Mr. Grossman insisted that computers had given New

## On the Technology of Oppression ...

Five years ago the Metropolitan New York chapters of the Association for Computing Machinery—in a collective call to the service of humanity—organized the first A.C.M. symposium on how computers can help solve urgent problems of city life. Five years later, with the fifth Urban Symposium tied to the 1970 annual meeting of A.C.M. in New York early in September, the message has clearly come through.

"Technology is a major tool of the enemy," said Herbert R. J. Grosch, a Research Fellow at the National Bureau of Standards whose off-the-organization views have won him a colorful reputation among computermen. "It is more at his disposal than at the disposal of our friends."

Who is the enemy?

"Mention A.B.M.," said Dr. Grosch, "and the enemies swarm to offer services. But when the disarmament agency looks for help, the offers come reluctantly. The major source of urban research funding in Washington is law and order. But if you decide you want to spend your efforts on subtler problems than information systems and mace—cleaner air or better schools, for instance—the money is hard to come by."

At a later A.C.M. session, Henry W. Bruck of the M.I.T. Urban Systems Laboratory called computer technology "the technology of oppression." Computers are an extension of the process of urbanization. Our cities, dependent on technology, marginally support "a class of technological illiterates who know nothing about the technologies upon which they depend." When the decision makers' resources become too superior, said Dr. Bruck, "the balance between those who exercise power and those upon whom it is supposed to be used will be destroyed."

And that time may be very near. The innovative applications of computers to urban problems—and there have been some, Dr. Bruck admitted—have come in such fields as transportation and development planning. There are elaborate computer-based services to help us "keep track of" socially undesirable people—credit



York City an invaluable method of complex analysis, showing what would happen to various management parameters under certain hypothesized future conditions. He cited, for example, a study of New York's fire-fighting resources and fire alarm experience (see *Technology Review for February, 1970, p. 62*) which had suggested that less equipment be sent to first alarms in certain sections of the city—with significant savings in the fire-fighting budget.

And there are many more complex issues awaiting study, said Mr. Grossman, himself a graduate of M.I.T. (class of 1951). What about the trade-offs between welfare payments and police costs? Where to build new city facilities?

Yes, replied Professor Manheim, but did you study the effect on the neighborhoods whose residents see fewer engines responding to their fire alarms?

Not in the computer, said Mr. Grossman. Putting community relations in the model for efficient fire fighting "would be ridiculous," he agreed. But it is a legitimate input for the final decision process. "We're fairly good at casting a cold eye on data if we have it."

## ... and the Support of the Status Quo

But what kind of data should we take into account?

Joan E. Jacoby, Director of the District of Columbia Office of Crime Analysis, described to the A.C.M. symposium a new automated system for giving the prosecutors in high-volume misdemeanor courts in Washington a clearer picture on which to base their choice of cases to be heard. It gives the prosecutor information on the status and history of each case and each defendant and on the probability of conviction; with it the prosecutor can rank cases for trial and automatically notify witnesses.

Miss Jacoby ran into a hail of cross-fire. Because the case load is heavy, only about half of the cases scheduled for a given day can be heard. The prosecutor decides which to bring up. He does so on the basis of the "blackness" of the defendant, the seriousness of the crime, the age of the case, and the probability of conviction, all based on data obtained at the time of arrest and by prosecuting attorneys reviewing the cases before trial.

Are the arresting officers careful? Is the attorney's evaluation right? And—even if it is—are these the right criteria for the decision? In short, said Miss Jacoby's critics, your system is using the computer to reinforce a system that should be overhauled.

They wanted instead the kind of revolution proposed by John P. Eberhard, Dean of the School of Architecture and Environmental Design at the State University of New York (Buffalo): "The proper question," he told

the A.C.M. symposium, "is not how with computers we can do better what we do now—but how we can build, manage, and use our cities differently than in the past because we have computers." We are in a new ball game, seeking good design not for itself but for man.

## Wave Watching

Every summer beach-walker knows something of the basic relationships between wind, water, and sand which are the most visible evidence of the complex processes of shoreline and beach. How steep is the beach depends on how high are the waves. The finest sand is at the top and bottom of the beach, the coarsest at mid-tide. The breaking waves yield a long-shore current, the direction and power of which depends on the waves' original direction and height.

But almost all of us are blissfully unaware of the scale of these processes and of how hard it is to quantify their determinants—to truly measure height of wave and beach, strength of current, and transport of sand. For a sense of their scale, consider the empirical formula proposed by Cyril J. Galvin, Jr., of the Army Coastal Engineering Research Center, at the M.I.T. Symposium on Water Environment and Human Needs this fall:

If  $H$  is the average height of waves in feet, then the total transport of sand along the beach,  $Q$ , for which those waves can be responsible in a year is given by

$$Q = 2H^2$$

where  $Q$  is in 100,000's of cubic yards.

The 250 miles of North Atlantic beach from Cape May, N.J., to Montauk Point, Long Island, are a unique laboratory for Dr. Galvin's continuing research. His scientific instruments are about thirteen volunteer observers of sea and beach. An experienced wave watcher can determine within  $5^\circ$  the direction from which waves are approaching the beach; not even a \$100,000 instrument can do as well, and the wave watchers do it for free. To measure the width and slope of beach, Dr. Galvin places posts whose height above the sea is accurately surveyed. Then the same wave watchers simply record each day the level of sand on post. Thus is beachcombing turned neatly into engineering for several hundred coastal residents.



While mean salary increases for civil engineers in industry rose 12 to 18 per cent from 1967 to 1969, according to the American Society of Civil Engineers, the Engineers Joint Council reported mean salary increases for civil engineering educators from 15.3 per cent at the instructor's level to 23.7 per cent at the level of dean, in the two-year interval from 1966 to 1968.

## The Energy Frontier

Just as America has closed its frontiers of land, so now must we close our frontiers of energy by ending the growth rate in our consumption of power?

Though we can expect to continue on our present course for at least five more years, Norman H. Brooks, Professor of Environmental Science and Civil Engineering at the California Institute of Technology, told the M.I.T. Symposium on Water Environment and Human Needs this fall that "environmental constraints will put a definite limit on future power consumption." Indeed, he insisted, there is "no alternative to recognizing that there is a limit to the density of energy release we can tolerate.

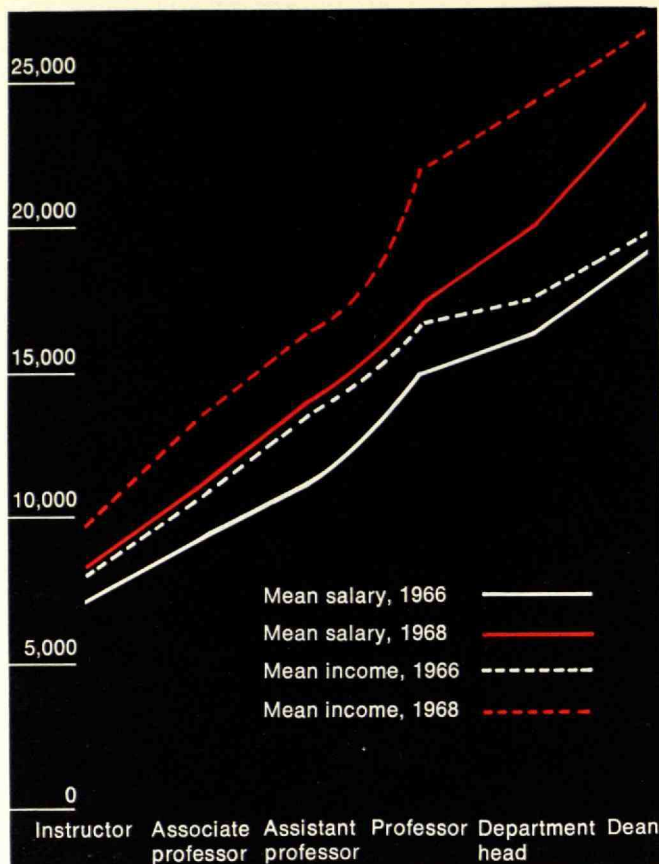
"We must come to consider energy as a scarce resource to be carefully allocated," he declared.

Per capita energy demand is increasing at the rate of 5 per cent a year in California, and this growth is compounded by California's growing population. If present trends are unchanged, California's peak demand will be 115,000 megawatts by 1990—compared to the present 22,800 megawatts.

Ten years ago we were concerned about fuel supplies. Now we know nuclear energy assures us of ample fuel, and we begin to see that energy use will ultimately have to be limited because of unavoidable environmental impact.

Heat is an example. For every unit of energy made into useful electricity by either steam or nuclear plant, approximately two units of energy in the form of heat must be discharged into the environment as waste. A 6,600-megawatt power station now being proposed for the California coast at Point Conception will generate 12,000 megawatts in waste heat—ten times the total power capacity of Hoover Dam, or an amount equivalent to the average solar power which falls naturally on 70 square kilometers of ocean (perhaps large enough to have significant geophysical effects, said Professor Brooks). Heat is also released to the environment whenever the electricity is used.

If you choose to locate a large generating plant away



from the seacoast and use large cooling towers for waste heat transfer to the atmosphere, the cost of electricity will only be increased a few percent. The added costs would be 0.2 to 0.4 mills per kilowatt hour for cooling towers, and 0.2 mills for transmission for each hundred miles.

Professor Brooks' conclusion: "You can keep fixing up environment problems one by one where they arise, but no matter what you do you come to the conclusion that ultimately the heat problem can only be solved by stopping the growth of power demand."

## Civil Engineers: Upping the Ante

The average salaries of civil engineers rose 15.4 per cent in the two years from 1967 to 1969—the largest two-year rise in a decade (1959 to 1969) when civil engineers' salaries have gone up some 43 per cent. In the same decade, says a report of the American Society for Civil Engineers, median so-called entrance salaries (salaries for engineers starting in new A.S.C.E. grades) for privately employed civil engineers were up 49.8 per cent and publicly employed civil engineers 61 per cent.

The A.S.C.E. Conditions of Practice Committee says that civil engineers employed in railroads, utilities, and industries had the highest increases in entrance salaries—18 per cent—in the two-year period from 1967 to 1969; next were those in construction firms, 17



per cent; state highway departments, 16 per cent; municipalities and counties, 14 per cent; and consulting firms, 12 per cent.

During this two-year period the sharpest rise in median starting salaries among all nine A.S.C.E. grades was for recent civil engineering graduates just entering the job market. Their median salary expectations have risen by \$1,030.

University employers were not surveyed by the A.S.C.E. Committee. But a separate study by the Engineering Manpower Commission of Engineers Joint Council indicates increases ranging from 15 to 23 per cent for civil engineering educators in the two-year period from 1966 to 1968, suggesting that universities were then doing somewhat better than their industrial competition.

Industrial employers reported to A.S.C.E. that the amount of annual base payroll in addition to salary represented by fringe benefits such as continuing education, insurance, profit-sharing plans, bonuses, and retirement plans amounted to 23.69 per cent in 1969.

## Butter Is Blameless—Maybe

If you gave up eating whipped cream, butter, and the browned, crunchy fat around your steak a few years back—unhappily—you can feed your conscience a handy rationalization and return to contented consumption. The amount of cholesterol you eat (found mostly in saturated fats) apparently has no discernible relationship to the amount of cholesterol in your blood.

The Heart Disease Epidemiology Study, conducted for the last 20 years in Framingham, Mass., continues to publish its series of reports (although its funding was cut off—prematurely, many physicians feel), and the latest describes its findings on cholesterol levels and heart disease. Four hundred and thirty-seven men and 475 women from the total Framingham group of 2,282 men and 2,845 women were watched for ten years with regard to: blood cholesterol levels and incidence of heart trouble; their daily intake of calories, broken down into animal and vegetable fat, protein, complex and simple carbohydrates; and specifically their intake of cholesterol, a type of fat.

The amount of blood cholesterol had been previously correlated to the occurrence of heart disease—this prompted the national switch to unsaturated fats (safflower oil margarine, imitation whipped cream, etc.). What the Framingham study's biennial examinations showed was that no correlation could be made between the amount of cholesterol eaten and that which reached the blood.

Unfortunately, their results are not a pure mandate to eat what you will. How your particular body handles what fats you put into it is quite another question, and no one yet understands the individual differences. What

you eat along with the fats probably helps or hinders their reaching your bloodstream; the enzymes you produce—and therefore the genetic make-up that determines the enzymes—also decide how the fat will be used. It seems that at least 40 different steps change the fat on your plate to fat in your blood, and more than that number of enzymes. The amount you eat at any given time also influences how much you use.

Further differences can occur among populations. The Framingham study used a rather homogeneous group; a comparison between this group and a group of Japanese might well show that one group, eating less fats than the other, also had lower blood cholesterol levels. Animal studies show that each individual has a stable place in the rank order of the population, regarding this trait, regardless of what special diet the group eats. But whatever his rank, his blood cholesterol level, and that of the group, rises and falls with different diets. Participants in the Framingham study ate, on the average, less cholesterol than most Americans; some physicians feel a relationship might be apparent with higher intakes.

The Framingham study, the longest of its kind, has developed other data as well. Women, for instance, are much less susceptible to heart attacks than men. It also found a positive correlation between smoking cigarettes and heart disease—the number smoked each day is important, but not the number of years one has smoked. The damage is completely reversible. Perhaps the study's most surprising discovery was the number of its subjects who had heart attacks—about one-fourth of the first, nonfatal ones—without knowing it. Damage to the heart would show up on an ECG when the subject had no recollection of pain or perhaps even of illness. If symptoms did appear at the time, they might be like those of another disease from which the person suffered. These unrecognized attacks are no less dangerous than the felt ones, however, and the study recommends periodic ECG's for people known to be susceptible to heart disease.

## Nuclear Chemistry: A Pollution Sleuth?

What are we breathing? What is it doing to us? And where does it come from?

The questions are clichés, but the answers are not. W. H. Zoller and Glen E. Gordon of the University of Maryland have now reported their results in analyzing the Boston-area atmosphere for particulates in the spring of 1969. Using a new method called instrumental neutron activation analysis, Dr. Gordon and Dr. Zoller found 23 identifiable—and foreign—chemical elements, including two—aluminum and vanadium—concentrated in the air we breathe at levels as high as lead. While the effects of breathing most of these 23 elements are unknown, there is reason to suspect that at least one, vanadium, may represent a health hazard. Dr. Mary Amdur of the Harvard School of Public Health has found



that the adverse effect upon guinea pigs of inhaling sulfur dioxide is strongly enhanced in the presence of water droplets containing vanadium salts.

Dr. Zoller and Dr. Gordon (Dr. Gordon is a former member of the M.I.T. faculty) collected aerosols on filters, irradiated the filters with neutrons, and counted gamma rays emitted from the resulting radioisotopes in order to identify the original materials. Their filters collected all atmospheric particles greater than about  $0.1 \mu$  (0.000004 inch) diameter. Ernest S. Gladney, who completed his undergraduate work at M.I.T. in June and is now a graduate student at the University of Maryland, went a step further, separating particles according to size by passing air through a six-stage cascade impactor before analysis. This approach gives more definitive information about the source and interactions of pollutants attached to particulates, as the size of particles depends on their method of formation and subsequent chemical reactions in the atmosphere. He received a \$500 prize for outstanding undergraduate research from the American Chemical Society Division of Nuclear Chemistry last June. Professor Gordon, who—with others—has just instituted a program of nuclear and environmental chemistry at the University of Maryland, calls this “a striking accomplishment, pointing toward the growing importance of the use of nuclear methods in the study of environmental problems.”

Speculation that the vanadium discovered in the Boston samples came from residual fuel burned in power plants is supported by Mr. Gladney's results. He found that vanadium is strongly concentrated on the smallest particles—typical of material from oil combustion—while aluminum is mostly attached to the larger and medium-sized particles expected from coal burning or natural terrestrial dust. On the other hand, he found manganese uniformly distributed over all ranges of particle size, probably indicating origin from a wide variety of sources.

## Science Policy? Never

When the House of Representatives Subcommittee on Science, Research and Development asked him this summer to advise it on science policy for the U.S., Raymond Bowers, Deputy Director of the Cornell University

Program on Science, Technology, and Society told the Subcommittee that he is a skeptic. “I am aware of many efforts to formulate national science policy,” he said. “I have never seen it successfully accomplished.

“The scientific enterprise is an exceedingly complex one, intertwined with many aspects of our national life, including education, industry, defense, and culture.” How, in this “enormous manifold of activities,” can we define some set of enunciable procedures to express a national science policy? he asked.

The troublesome matters today, said Professor Bowers, are concerned with priorities and rates of growth, and it does not take a major study of science policy to ascertain that “we are in for serious problems” because of “the present erosion of the scientific and technical potential of this country.”

For example, he said, with respect to graduate education, inflation consumes about a 4 per cent increase in costs per year, the “increasing sophistication of research technology” from 3 to 5 per cent, and the graduate-age population increase about 4 per cent. Obviously, “recent levels of appropriations will cause a contraction in the system of graduate education in science.”

And what is so serious about that, in view of the current evidence of a short-term excess of doctorates in the sciences (*see Technology Review for July/August, pp. 50-51*)? Simply that the present oversupply is in fact a short-term one, and current levels of support are inadequate for building “a vigorous system of graduate education in science” for the future. Indeed, Professor Bowers said, it is his judgment that “organizations experiencing severe budget cuts become more conservative and cautious and less innovative. I suspect that this is connected with the fact that a man's agility is generally impaired if you tie a rope around his neck and gently tighten it.”

## Which Language for Indian Science?

The republic of India is a federation of 16 states with 14 main languages between them, not including English. Six years ago, Hindi became the official language. But less than half the population speak Hindi, whereas English became well established in the spheres of administration and education during the years of British rule. So the language question, in one form or another, complicates almost every progressive endeavor, including the teaching and publication of science and engineering.

“There are some,” according to an article in the Indian monthly *Science and Culture*, “who recommend that the acquisition and dissemination of scientific knowledge should be made through one's mother-tongue, others who advocate the use of a link language for the whole of India like Hindi for the purpose, and another sizeable section is in favor of the continuance of English.” To obtain the views of “those who are interested in the



cause of Science and Technology," P. K. Bose and S. P. Mukherjee, of Calcutta University's statistics department, sent a questionnaire to members of the Indian Science Congress Association. The mixture of opinions they obtained—on matters which are taken for granted in monolingual countries—give some idea of the difficulties which the Indian professional faces merely in communicating with his colleagues.

More than half the respondents thought that high schools should teach science and technology in the local language, whatever it might be (English came a very bad second, with Hindi among the also-rans). But for undergraduate university teaching of the same subjects, more than half recommended English and only about 20 per cent wanted the local language of the university used.

These two recommendations become consistent if the Indian student is compelled to fulfil a language requirement for entry into university: if, that is, virtually every Indian undergraduate is at least bilingual. About two-thirds of the respondents thought that "an adequate knowledge of English is a necessary prerequisite for admission to undergraduate courses in science and technology"; another one-third thought that English and Hindi both should be required. Only 4 per cent were prepared to dispense with English and put their faith in Hindi as the Indian common language. The general consensus was that publication, too, should be bilingual.

The question of publication raises the related matter of which script to use: the imported "Roman" script, the indigenous Devnagri, or a new script specially developed for science and technology. Not everyone was concerned that there should be a common script, but of those who were, a sizable minority (28 per cent) chose Devnagri for the purpose. Devnagri was favored by more than half of those whose mother tongue was Hindi, Marathi, or Gujrati. The invention of a completely new script was far from being a popular idea, but—for no very obvious reason—it tended to be favored by geoscientists (*Science and Culture*, Vol. 36, No. 2).

## A Rusty Phoenix

Seven million cars are discarded each year—17,724 million pounds of steel, 3,577 million of cast iron, 224 million of copper, 378 million of zinc, 140 million of lead and 1,015 million of rubber, to mention the most obvious materials. Only imaginatively are they described as junk. Yet, making these materials "resources" is a problem of economics. Recovering them is not necessarily rewarding. A process called fragmentation, in which the car is stripped, shredded, and its ferrous parts magnetically separated is feasible only in large cities. Only large quantities of hulks can justify the expensive equipment. The method does, however, yield fairly clean steel. Stripping, incineration, and baling is the method of choice for less populous places. The equipment is cheaper, although the cost per car is higher. And a

lower quality scrap is usually produced.

The Bureau of Mines, of late directed to study the recovery of materials from solid wastes, has proposed a variation of the second method that would yield high-grade steel scrap for the automotive industry as well as clean quantities of the other metals.

Their financially attractive plan revolves about a new incinerator which is inexpensive, smokeless, and designed for a medium-sized operation. It costs about \$22,000 to build, much less than other units. Two or three cars, depending on how thoroughly they are stripped, are carted by rail into a garage-like building, ignited, and burned—a 20-minute process. The resulting smoke is drawn into a chamber containing a gas after-burner and consumed further. Leftover gases leave through a smokestack. In a test which burned 36 cars in 378 minutes, the stack effluent measured between 1 and 3 on the Ringelmann scale (a visual comparison chart scaled from 0 to 5) for 11 minutes and at 1 or below the rest of the time.

In the Bureau's plan, a car is purchased and delivered to the scrap yard for nine dollars. Its wheels, wheel covers, tires, radiator, and battery and cables are removed. Then it is incinerated. When it is cool, its exterior and interior trim along with other odds and ends are removed and separated. The hulk is compressed and baled, ready to ship.

This relatively careful cleaning yields a 2,614-pound bundle of #2 iron and steel containing less than 0.1 per cent copper, 429 pounds of cast iron, 32 pounds of three types of copper, 54 pounds of zinc, 50 pounds of cast aluminum, and 20 pounds of lead. The value of the metals is \$55.94. The cost per wreck for their recovery is \$51.24. A yard processing 12,000 cars per year, the number expected from a population of 300,000, would sustain a profit of \$56,380 after depreciation, operating, and labor costs. It would require a capital outlay of \$275,000, and would return annually 19 per cent of the initial investment.

Variation of the procedure might increase the purity of the steel removed, or might make separation less costly. Either would raise the profit, and the Bureau suggests that each is possible.



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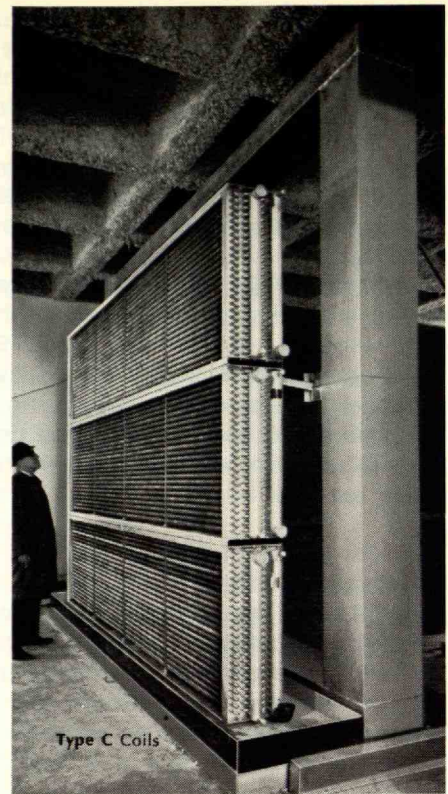
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## The Clean Air Car Race

... "a singular caravan across America, carrying to all who would listen the message of clean air," by Bruce S. Schwartz, a uniquely talented M.I.T. undergraduate for whom the race was a voyage of personal discovery.



## For Economics as a Science

Paul A. Samuelson's first book (*Foundations of Economic Analysis*—1947) begins with this statement (by Professor E. Hastings Moore of the University of Chicago) of a "fundamental principle of generalization by abstraction": "The existence of analogies between central features of various theories implies the existence of a general theory which underlies the particular theories and unifies them with respect to those central features."

Professor Samuelson then described how—after "laborious work" in such "seemingly diverse" fields as production, consumer behavior, international trade, public finance, business cycles, and income analysis—he realized that "it is possible to deduce general principles which can serve to unify large sectors of . . . economic theory."

"In fact," he wrote, "any sector of economic theory which cannot be cast into the mold of such a system must be regarded with suspicion as suffering from haziness."

In two decades since then, Professor Samuelson's professional contributions have been built on such a concept of the wholeness of economics—that no part of any economic system can be viewed alone, that the whole is a dynamic and interacting body which rests on definable, unifying principles. His abilities to work at this level and then to apply such abstract methodology to current economic problems with brilliance and wit have led him to write or co-author some 10 books—including one best-selling text of which more than 3 million copies are in print—and several hundred papers and articles since 1940, when he first joined the M.I.T. faculty. And on October 26 they led him to the 1970 Nobel Prize in Economic Science.

He has "done more than any other contemporary economist to raise the level of scientific analysis in economic theory," said the Swedish Academy of Sciences in announcing the award.

Though Professor Samuelson was cited for his analytical studies and he insisted that the Nobel Prize and politics have nothing to do with each other, newspaper interviewers on October 26 found his comments on current economic affairs made better copy. The real need in economics today, Professor Samuelson told them, is a better understanding of "the cruel dilemma"—the tradeoff between unemployment and inflation. And of the two, unemployment should now be the major concern, not inflation: "You don't want to kill the patient in order to cure his disease," he said. "Our present recession says 'made in Washington.' It has nothing to do with a lack of work. If there were good economic policies coming out of Washington, you shouldn't have to ask why a man lost his job. You should only have to ask him why he cannot get a new one."

"Our students are right," he said; "a great technological nation like the U.S.



Professor Paul Samuelson learned he was a Nobel Laureate on October 26 in an "absolutely standard" fashion. A radio station called at 5:45 a.m. and read him the citation. It referred to his "outstanding ability to derive important new theorems and to find new applications for existing ones. By his contributions, Samuelson has done more than any other contemporary economist to raise the level of scientific analysis in economic theory. . . . He has written considerable parts of central economic theory and has in several areas achieved results which now rank among the classical theories of economics."

After the day of champagne toasts interspersed with press interviews and telephone calls, Dr. Samuelson told the newspapermen, "In 24 hours you fellows will all be gone and I'll pick up my pencil . . ."

Connecticut and Massachusetts have a major stake in defense prime contracts. Because so much of its work is on advanced systems and research and development, Massachusetts is especially vulnerable to a general decline in defense research funding. Connecticut depends mainly on aircraft engine contracts, but not for planes used in Vietnam. So it is vulnerable to general procurement cutbacks rather than cutbacks resulting from the end of the Vietnam war. (Data: Federal Reserve Bank of Boston)

has important things to do"—things like solving social problems, providing better education, improving cities and transportation. For example, the failure of government to provide more funds for education is "nothing short of scandalous."

Dr. Samuelson's career at M.I.T. began one year before he completed his Ph.D. at Harvard, where his thesis contained much of what was later published in *Foundations of Economic Analysis*. Born in Gary, Ind., of Polish immigrants, he spent most of his youth in Chicago and studied at the University of Chicago (B.A. 1935) before starting for his master's degree (1936) from Harvard. He was named Institute Professor at M.I.T.—the highest distinction which the Institute can confer on one of its faculty—in 1966, almost 20 years after he became full professor in the Department of Economics. His current work is on growth models, speculative prices, and theory of value.

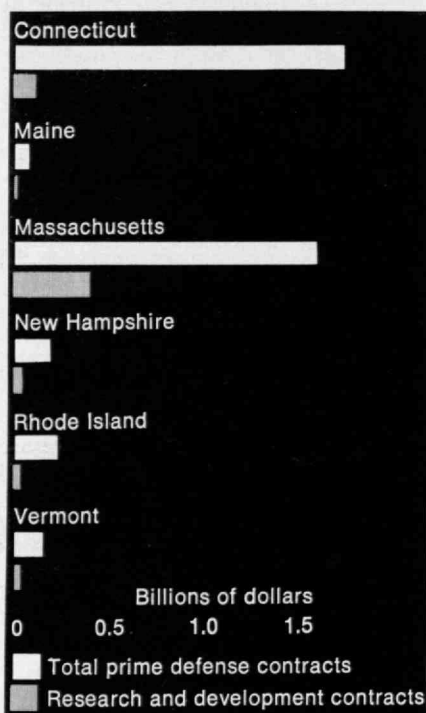
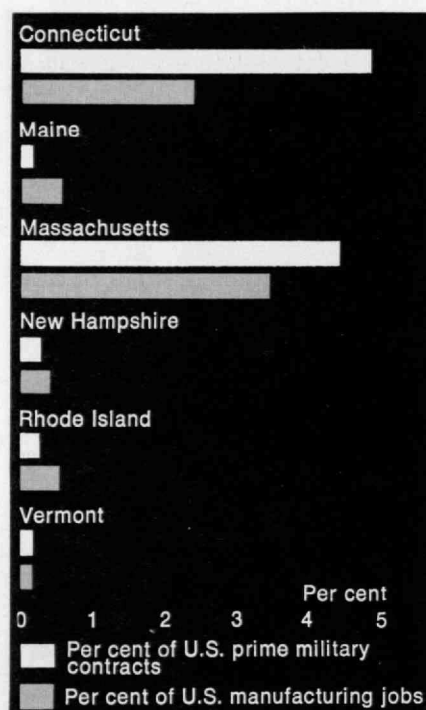
## New England's Stake in Defense

A post-Vietnam decline in military spending—which might be as much as 20 per cent of the federal defense budget—would be a "noticeable setback" for New England. But these states "have undergone several periods of similar readjustment during the past two decades without chronic unemployment," according to two members of the Federal Reserve Bank of Boston research staff; therefore, they say, "it seems likely that the present and projected defense spending cutback will hurt the region in the short run but will have no serious long-run consequences."

In a study for a special Massachusetts commission now published in the Federal Reserve's monthly *New England Economic Indicators*, Robert W. Eisenmenger and Mary N. Chamberlain say that since 1954 the five New England states—with 8 per cent of U.S. population—have averaged about 10 per cent of total defense prime contract awards. The total in 1969 was 10.3 per cent; and though military prime contracts were down 22 per cent in the first three-quarters of fiscal 1970, New England's share remained essentially constant.

There are interesting variations between the New England states. In 1969 Vermont had 12 per cent of the Defense Department's weapons contracts; Connecticut had more than one-third of the Defense Department's aircraft engine contracts. More than half of Massachusetts' prime contracts are for missile and space systems and electronic and communications equipment; Massachusetts also has a large stake in research and development for the military. When all defense activities—both prime contracts and subcontracts—are considered, Connecticut has 7.5 per cent of its work force in defense, twice as much as the U.S. as a whole; New Hampshire (6.4 per cent), Rhode Island (5.3 per cent) and Massachusetts (4.6 per cent) are also above the national average. Thus Vermont might be severely hurt by a de-escalation in Vietnam, while Massachusetts is especially vulnerable to a general decline in defense research spending. Already curtailment in defense spending to date "is beginning to hurt the Massachusetts economy," says the F.R.B. report.

Why the essentially optimistic outlook for New England's stability in the face of declining military spending? Mr. Eisenmenger and Miss Chamberlain cite these factors: the post-Korean recovery was completed in about a year; national fiscal and monetary policy is now sophisticated enough so that the U.S. can expect steady economic growth; the New England economy is now based heavily on fast-growing, specialized durable goods and service industries; very few New England areas have recent histories of chronic unemployment; the labor force required for defense work is in general highly skilled, compared with the average, and the demand for such workers is always high; and defense spending is in general concentrated in high-income areas, where in-migration and tight labor markets are the rule.





# Wanted: An Educator

Why—in these days when students, financial officers, and even the F.B.I. bring so much bad news to his office—should anyone want to be a university president?

Because, says Howard W. Johnson, who startled the Institute community this fall by announcing his plans to retire after only five years as President of M.I.T., the president really has to be an educator.

"The thing that makes the job attractive," said President Johnson late in September to a joint committee of students, faculty, and alumni which will advise the M.I.T. Corporation in its search for a new President, "is the opportunity to become involved in helping to create an educational program that will be important in the years ahead.

"What makes the job unattractive is the difficulty of finding time to do this," he said.

Mr. Johnson insists that he is not leaving the Presidency of M.I.T. simply—or even chiefly—because the job is so demanding of time and energy (see *right*). He thinks that university presidents should not stay in office for the long term—but should give way after perhaps five years to new people with new ideas. And he hopes that his move from President to Chairman of the Corporation at M.I.T. can be a catalyst for a reorganization of the Institute's top management so that the President's job becomes more "realistic," so that the Corporation itself as well as other administrative officers can more fully share the burdens of management, and so that more of the President's time and energy can be devoted to the key problems on whose solution the institution really depends for its future.

President Johnson's advice to those searching for his successor: "Find someone who has the intellectual capacity to meet the need . . . and gets a lift out of helping to create an educational program to serve people he will never see."

"You want an educator," he told the committee.

## The Clouded Horizon of the Auto Industry

Can the automobile industry build a car which will eliminate nine-tenths of the harmful emissions of present day cars—and still meet market prices? Can it meet a likely new government deadline of 1976, or 1975 at the earliest?

Automobile industry spokesmen used terms like "impractical" and "impossible at the present time" during hearings prior to Senate passage (73 to 0) of the tightest antipollution law in U.S. history, which would force industry to cut its auto pollutants one-tenth in six years. Yet one engineer who has worked in the field of automotive air pollution says the industry "can and will" meet those government deadlines.

"It's no secret that it can be done. Last summer's Clean Air Car Race proved that it can be done," says James A. Fay, Professor of Mechanical Engineering at M.I.T.

The technology of pollution control on internal combustion engines is at a stage where large reductions in harmful emissions may be made most cheaply and reliably through "bolt-on" devices, such as the Engelhard catalytic reactor, now sold commercially, and used by some 20 of the en-

## M.I.T. President Warns of Politics, Funding Dangers

During times when U.S. colleges and universities must confront "anti-rationality," "anti-intellectualism," and the strongest threats and acts of violence they have ever known, they face two great dangers: "The tendency of students and faculty members around the country to turn the university into a political partisan on public issues," and their growing "financial plight," Howard W. Johnson, President of M.I.T., told members of the M.I.T. Corporation in his annual report early this fall.

The effort to persuade universities to adopt political positions on public issues may, if it succeeds, produce a new political force, but "it will end the public's trust in our intellectual and educational mission" and "blunt the strongest force for improvement in our society," President Johnson wrote.

"In the end we will have lost the privilege of free inquiry, free expression, and dissent. It is, in my judgment, that serious."

Turning to his second major concern, President Johnson declared that the "large deficits now in the offing for many institutions clearly cannot be allowed to stand. . . . No solutions, short of dismantling our efforts, have so far been found. . . . But without them, the result will be poverty for learning and scholarly advance.

"These signs of danger for the universities . . . are not the nourishers of learning and truth nor are they the harbingers of productive change," he wrote.

Yet President Johnson hastened to insist that these problems, and the universities' general vulnerability to violent attack, are not a sign of weakness. "We have purposely developed no armor, no moats, no walls—because they would have destroyed [the universities'] openness." President Johnson recalled his words to the M.I.T. faculty in November, 1969: "We are vulnerable, we were created vulnerable, and we will remain so as long as we are free."

Reviewing the accomplishments at M.I.T. in 1969-70, President Johnson listed six "fundamental questions that we must address persistently in the next year and beyond:

- ◇ How do we relate the advancement of knowledge to the problems of our society without becoming politicized?
- ◇ How do we assure the healthy process of dissent without the eroding force of violence?
- ◇ How do we achieve educational change without impairing our standards of scholarship?
- ◇ How do we press forward in science and technology awareness of the full impact of discovery and development? How do we act responsibly on that awareness?
- ◇ How do we finance higher education?
- ◇ And how do we continue to merit the public trust?"

The automobile industry "can and will" develop the capability to reduce all automotive air pollution by 90 per cent in the next six years. They will do it "at greatest reliability and least cost" says James A. Fay, Professor of Mechanical Engineering at M.I.T. (Photo: Don Estes)



trants in the student-run transcontinental C.A.C.R. last summer. Although these and other "bolt-on" devices have the advantage of involving no fundamental changes to the engine itself, they are still expensive to make and add to a car, thus threatening to raise the prices of autos more than the industry would otherwise. This was the situation, apparently, which industry spokesmen referred to, but Professor Fay says, "any engineer knows that there are problems between the laboratory and the production line. But producing highly reliable, cheap devices in huge quantities is just what the motor industry is so terribly good at!"

On building a low-pollution internal combustion engine, he says, "What you are talking about developing is a simple, cheap piece of equipment at the rate of 10 million per year. It's not the same as a space rocket, because the amount of money needed to know everything about this cheap piece of equipment is not so vast. The main factor is the time it takes to explore all the possibilities of what to do with that equipment.

"I had doubts that the Clean Air Car Race would amount to anything. I thought only a few of the cars would meet the stricter emissions standards, and then industry would be able to go to Senator Muskie and say, 'See—it can't be done so easily!' But look what happened: the only cars which met the standards were altered internal combustion engines! Moreover, many of the student entries met the standards. And the car that won was developed by a team who worked at the Ford Motor Co.! The Wayne State Boys had access to Ford through their employers, and some understanding of the problems. The fact that they won means that there is some understanding of these problems in the auto industry."

Professor Fay notes that "previous antipollution bills instructed government agencies to set limits of permissible pollutants from cars." But they left the amounts allowed up to the agencies to determine. The new bill passed by the Senate "writes in the numbers so to speak. It is a way of making the precise standard irreversible. It is hard for a government agency to resist pressure from the industry. It's much easier for the agency if it can point to a law and say—it's not me that's telling you to do this, it's Congress!"

Professor Fay also points out that the Senate bill shifts the cost of anti-pollution devices to the car buyer, thus making the blow for the auto industry (somewhat) easier to bear. "If the industry finds it must raise prices for the less polluting cars—they can blame it on the federal government."

Will the bill actually change our 1976 smogscape? Although automobiles cause half of the country's air pollution, Professor Fay says the country won't see significantly clearer skies until around 1985, by which time all the pre-1976 cars will be too old and off the road. Even so, "no one expects that this is the end of the story. But it is a major milestone in cutting back pollution.

"You gauge pollution on the number of autos in an area, the number of



miles driven in an area, and the amount of emissions per auto. If there are ever more cars in an area, they could offset the positive changes we would otherwise see by 1985. Hence the bill may force only a 50 per cent reduction in auto emission pollution rather than a 90 per cent emission. But no one expects that one law is the end of the story."

Does this mean that other types of engines—such as the turbine, electrics, and steamers which attempted the race last summer—are ruled out for the future? "Once you reduce emissions by 90 per cent, that's about all you can do with our present types of engines. Then, if you want to cut pollution by another factor of 10, you will have to go to other types of cars and designs. At that point you can introduce the other engines and new technologies."

## Environmental Consensus?

Can the issue of environment provide a focus to lead science into a new era of creative contributions to American life?

James R. Killian, Jr., Chairman of the M.I.T. Corporation, recalled for the House Subcommittee on Science, Research and Development late in the summer how the post-World War II era had been for the nation "a period of organizational inventiveness, of growing support, and of focussed objectives" which, he said, "may well take its place among those rare moments in history when circumstances combined to set the stage for an outburst of intellectual energy and a surge of creative accomplishment—a towering peak in cultural history."

One element in this consensus, Dr. Killian said, was the federal government's "bold and responsive adaptability to new opportunities opened by science and technology."

But now this post-war consensus is breaking up; we are concerned about misuses of technology. We are experiencing "an emotional attack on rational processes of thought, both humanistic and scientific." So there is no longer "a touchstone for all the many decisions, both public and private, which must be made in the conduct of our science and technology." Instead, our present "circumstances of change, doubt, and wavering convictions" threaten basic research, science and engineering education, the continuity of technological skills, and the partnership of the federal government in creative scientific support.

The government's efforts, "to grasp an extraordinary opportunity to provide world leadership in dealing with ecological problems" may, said Dr. Killian, be the new focus which we need. We all feel "a sense of mission associated with the search for environmental quality," and Dr. Killian suggested that this may represent that new force in technology which "is essential for meeting social needs and for economic growth."

*All that good fishing gone to waste! In the Massachusetts town of Rockland last summer, while one state group was stocking the pond with fish, and another state arm tried to "regulate" the four major industrial polluters who dumped wastes there, yet another arm of the state authorized a chemical spraying which—maybe—caused a huge fish kill. Perch, bass, cod, pickerel. Who was liable? Possibly no one. (Photo: Bill Backoff, Boston Globe)*



## To Kill a Weed . . .

So little is known about the ecosystem of the average town pond that a single attempt to clean it up can boomerang.

So learned the small Massachusetts town of Rockland late last summer, when it utilized a new state antipollution program to rid 11-acre Studley's Pond of the morass of weeds and algae which had been slowly choking it to death. The town applied to the State Department of Public Health's Environmental Division for a green light and funds. The division approved the project and hired a local firm, Allied Biological Control Corp., to move in one afternoon and spray with chemicals.

Legally, no one was responsible for the disaster which resulted. Within a week, some 4,000 perch, bass, cod, and pickerel—which no one even knew were in the pond—rose to the surface, dead. The dead fish piled up on the banks, and choked off a feeder stream.

In the hand wringing that followed, it emerged that no one—neither the company nor state health officials—had conducted tests to determine the level of oxygen in the pond prior to spraying. So no one knew the balance of oxygen, algae, and fish there. On the records, however, were tests made by the state a year ago, indicating that oxygen in the pond was extremely low—making a fish kill likely. But because there were no recent tests, no one could say that the spraying actually killed the fish.

Local newspapers carried mouth-watering pictures of seven-pound bass and other fish—big enough to whet the rod of any self-respecting fisherman. There were rumors that the state had been stocking the pond for years with those fish—but no one could ever see them through the murky waters of the pond. So few people fished there.

What really caused the trouble? Four major sources had been dumping wastes into the pond for years. Some of them are in the process of "being restrained" in their dumping by the state as a result of complaints. However, the industrial waste and sewage was the first cause of the overgrowth of weeds and algae, which in turn caused the low level of oxygen in the pond's water. The chemicals used—kuron and copper sulfide—can, under such conditions, be harmful to fish life. John Doyle, chairman of the Rockland Board of Public Health, concluded in the statement which closest resembles a summary of the situation: "We might have had a fish kill anyway if the chemicals weren't sprayed—but we wouldn't have had it in that volume."

Who is responsible? The type of contract signed stipulates that tests be made to determine oxygen levels prior to any treatment of the pollution. But in this case, neither the state nor Allied Biological made any tests. Just as community outrage about the weeds forced the state to organize a spraying



immediately, community outrage about the fish kill brought back Allied Biological Control Corp., the group which had gotten the state's contract, to clean up the fish. Jason Cortrel, President, estimates that the clean-up cost \$900 of the \$2,200 Rockland contract. "We lost on that one," he says. But he admits that even though it was the state's legal responsibility to make the prior tests, his firm should have done it anyway—"just in case."

## Present—But Accounted For?

Can you count the number of people in a room? In a city? The first is simple, but the latter is a grave problem, even for statisticians.

Workers for Mayor John V. Lindsay of New York found, for example, a garbage can in Harlem stuffed with census forms. Mayor Lindsay cited this example before the House Subcommittee on Census and Statistics in September, when, speaking for mayors all over the country, he expressed his frustrations with the federal census of 1970.

The fear is that the count is too small in densely populated urban slums. Mayor Lindsay's own staff had estimated there were 7,924,900 people in New York—while preliminary census results showed only 7.7 million. The consequences are serious, as the *New York Times* noted. "An undercount could cause the city to lose state and federal revenues it badly needs to improve essential services," since many allocations are calculated on a per capita basis. (During fiscal 1970-71, it will cost \$7.8 billion to run New York—or twice what it will cost to run the space program).

When Mayor Lindsay spoke to the Subcommittee, the *Times* reported the problems as he saw them:

◇ Under the U.S. Constitution, the census must be made every ten years. But this leaves a city guessing how many people are in it during the other nine. "You cannot take a photograph today and expect everything to look the same for ten years," the mayor said. Urban populations, particularly of young, single people and members of minority groups, move about too fast.

◇ Some percentage of error in the census was tolerable in the past. But now that the cities' financial plight is so much more acute the need to count every eligible head is very great. Guessing how many people live in a given building has become unacceptable.

◇ All U.S. Census forms are printed in English and, now, filled out on a voluntary basis by households. This discriminates, says Mayor Lindsay, against those who cannot read and write English, those native Americans who are illiterate, and those who are afraid of all government forms. Yet these people, who remain uncouned, are "the real victims of the inequities created by an inaccurate census," he said.

The mayor called for changes in the federal census: it should be taken every five years (the *Times* said that the Census Bureau itself has proposed this); sample surveys should be made in the interim, especially in densely populated communities, to keep government up-to-date on the count; and there should be more and better-paid workers for the Census Bureau with less reliance on mail forms.

Morris Axelrod, a professional survey taker for the Harvard-M.I.T. Joint Center for Urban Studies, agrees that the mayor's complaints are shared by many city officials. New England is the only region where many towns attempt a comprehensive, ongoing police file of who lives where. Elsewhere, he says, municipal knowledge—especially of young and minority populations—is notoriously inaccurate, a fact that in the long run works against the interests of the city and of those citizens. But he adds, "The U.S. Census Bureau is very self-critical," and eager to make its counts more accurate.

# College Education for the Nine Americas

Whether you believe we are living in an era of revolution or evolution with respect to the blacks and other minorities in America, you can't deny that we are living in an era when more and more minority students are entering college. How are the colleges—and the new students—really faring?

This was a central question at the 1970 meeting of the National Association of College Admissions Counselors in Boston this fall—with a question mark for an answer. "There's no such thing as absolute success in this business—all we can talk about is functional success," concluded one Ivy League college administrator (black).

What happens when minority students arrive on campus? A Puerto Rican girl said, "I go to sociology class and learn that, as a Puerto Rican, I am submissive, passive, and humble. I go to English class and am made to take phonetics because of my accent. I go to Spanish class to learn that the Spanish I learned at home is no good. . . ." An M.I.T. sophomore from Virginia, black, reported that black students, returning from the library at night, are often stopped and asked for I.D.'s by campus patrol. Or, in the gym, a group of blacks will be asked to show their athletic cards, while a group of whites will be allowed to play—no questions asked. "And an awful lot of people in white institutions don't know what the word 'boy' means to a black person, and they use it freely."

A student in a small Boston women's college spoke of the raised eyebrows in the dining hall when black girls sit together at dinner. "But we have more in common with each other, just like any group of friends." Her dorm mother once asked a group of five men, friends of hers, who were waiting for her in the lobby, to leave ("I had a little 'encounter session' with her after that!").

The institutions they enter are learning that maximum flexibility and adaptability are a primary requirement in minority programs. "It is not enough that a program meet those goals stated at the beginning. A second criterion of functional success is whether a program adapts to those problems which arise as

things evolve," said Edgar F. Beckman, Associate Provost of Wesleyan University, explaining the Wesleyan summer program, Me, My Goals, and Wesleyan. "We aren't going to plan next year's program until we hear from this year's students what should be changed," he explained. Paul E. Gray, Associate Provost of M.I.T., spoke of Project Interphase, which gives entering freshmen a summer of academic preparation and orientation at the Institute. He noted the importance of a built-in intermission, part way through the summer, so the participants can think about where they're going and if it's working.

Both Mr. Beckman and Mr. Gray said they can't yet tell how well their programs are working—the data simply doesn't exist. But it was symptomatic of their mood that both took issue with the title of their panel: "Successes in the Education of Minorities."

A second lesson which the colleges are learning is that they are part of the problem as much as part of the solution. "Our problem is less the student's socialization to M.I.T. than the socialization of M.I.T. to what it means to have a black presence on campus," said Mr. Gray. And Gloria Paige, representing a teacher training program with Miami University and the Cincinnati public school system, said: "You can have the best program in the world, but if the staff doesn't care, it'll be no good. A student can spot prejudice in two seconds and be turned off in three."

Another black administrator agreed that the faculty really needs the sensitivity training now being given to minority students. "We've come to the conclusion that faculty and police are much alike. They're authoritarian and slow learners!"

Some little symptoms of the big problem: John A. Mims, M.I.T. Assistant Director of Admissions, described how difficult it was, on one New England campus which had a black presence, to find a copy of *Ebony* magazine. "It isn't in the libraries, in the bookstores, in the newsstands. When I inquired, I was told there wasn't enough room on the shelves!" he said. And a militant woman student at a Boston



*The story of minority student unrest is—behind the scenes—the story of broken promises of unlimited financial aid, vague and nervous administration answers to requests for black clubs, dormitories, or athletics, and endless victimization of minority students by teachers who—wittingly or no—refer to the students in their classes as "boys". The result—such as the demonstration shown here—is all-too-well-known.*

*(Photo: Timothy Carlson—Harvard Crimson)*

state college described how their black students' club spent a year seeking \$200 for club activities, while the football team was dished out \$1,500 for new uniforms in 15 minutes! Finally there is the mood of despair among the students, bringing with it closed ears, intolerance, fatigue. Mr. Beckman said that this year's group of black freshmen (at the outset of the year) seemed "more intimidated, and less sure of themselves. They are feeling the pressure of the backlash nationally."

One bow-tied college representative asked the minority student panel, "What can I do to come across? I have to meet some Negro high school students in about an hour to talk about our college. Besides not saying 'boy'?" And the students unanimously said to him, in effect: Man, there's nothing you can do. You're not black. "You're going to look like the great white father who just bombed in from outer space." Another added, "Just don't tell them about how great your school is. Tell them what it isn't. At least that way they won't get their hopes up."

Another black student retorted, "It's a question of caring. I don't want to know how great you are. But I want to know that you care. We were taught that America is nine Americas; it's a white America, a black America, a red and a yellow America. I wonder if you really know that it is nine countries—not one."—D.S.



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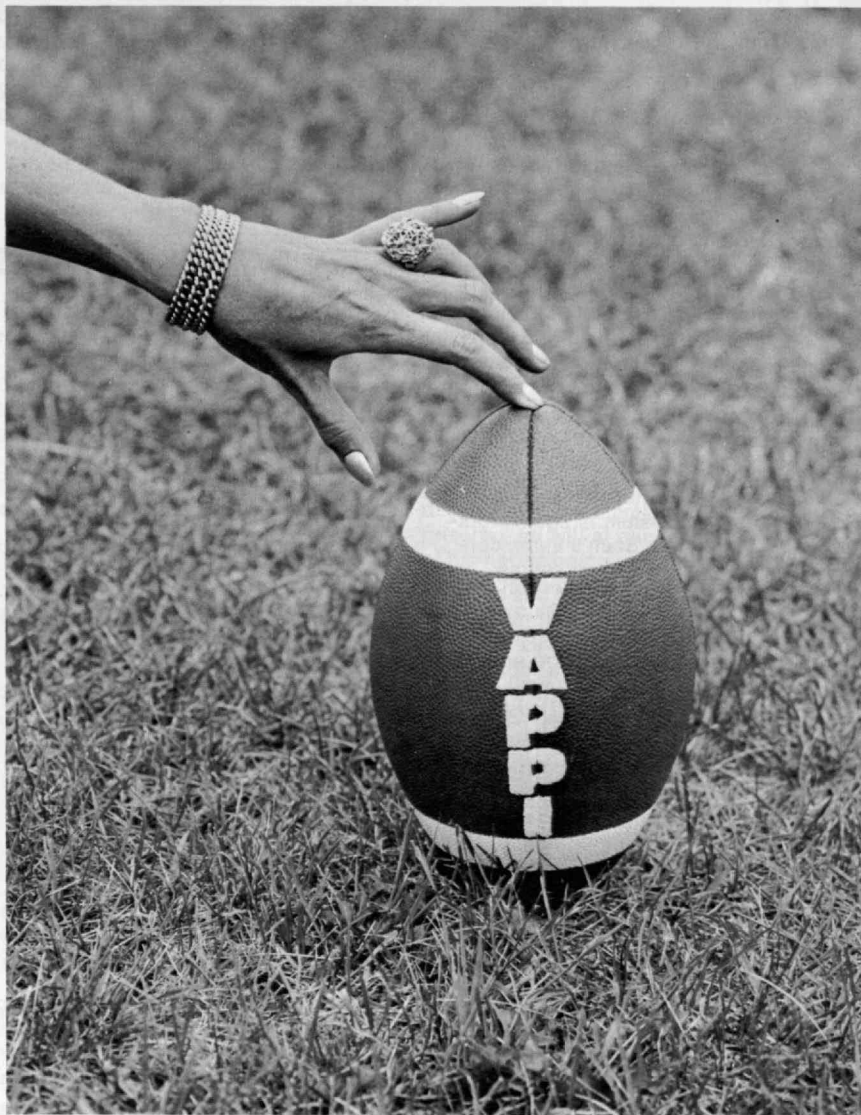
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# Bridge Becomes a Monthly Feature

It finally happened. After two years of silence, my stereo system is again working. As I listen to J. S. Bach's violin concerto in A minor, all the effort seems almost worthwhile. The hero of this episode is John Forster (M.I.T. '67); his patience and expertise enabled us to trace the failure sequence to a factory-miswired printed circuit board (two diodes were misplaced). Not only can I now enjoy music—but sleeping will be easier, knowing that my wiring, while "not the neatest ever seen," to use John's sympathetic terminology, was not in error. Now we can hope that the case is closed forever.

Many people have complained that their solutions have appeared in the "Better Late Than Never" department when they thought that the solutions were submitted promptly. In order to explain why this happens, let me say that today's date is October 1.

I should like to ask that we have no more contributions concerning last year's problems—meaning those published in or before the July/August, 1970, issue of *Technology Review*. This will help my filing system, and I feel that those problems have by now lost their interest.

Currently, problems are appearing about seven months after I receive them. Thus I have a backlog which will last until the end of the current volume.

## Problems

I will try to include exactly one bridge problem in each issue. This month's selection is from C. C. Crystal:

**6** Given the following hands, and West's lead of the ♠5, how can South make seven hearts?

♠ —	♠ —
♥ 10 9 8 7 6	♥ K J 9 8 7 6
♦ A K	♦ 5 4 3 2
♣ A 10 9 8 7 6	♣ —
♠ 5 4 3 2	♠ A Q 10
♥ —	♥ A K Q J
♦ 6 5 4 3 2	♦ Q J 10 9 8 7
♣ 5 4 3 2	♣ —

This next problem, of the number-theoretic variety, is from Donald Morrison:

**7** Fill in the array below with 36 digits such that the six-digit number "a," read left to right, equals the vertical number "A," read top to bottom; b = B, etc.; and also so that b = 3a, c = 2a, d = 6a, e = 4a, and f = 5a.

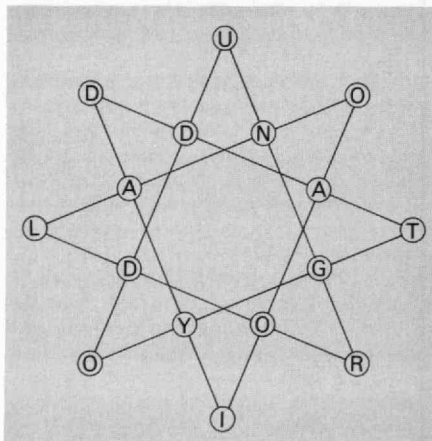
	A	B	C	D	E	F
a						
b						
c						
d						
e						
f						

A geometric problem comes from Joseph T. Patterson:

**8** Given the lengths of two sides and the included angle bisector, construct the given triangle using compass and straight-edge.

This puzzle, from Walter Penny, requires both geometry and number theory:

**9** The numbers from 1 to 16 were written in the circles of the diagram below in such a way that the sum of any four numbers in a straight line was the same. Then the number 1 was replaced by the first letter of a saying, number 2 by the second letter, etc. The final configuration is shown. What was the saying?



We end this installment with a problem from tenth-grader Leslie Servi:

**10** Under what additional conditions is it true that  $6x + 1$  or  $6x - 1$  is a prime number when x is a counting number?

## Speed Department

The first speed problem this month is from R. Robinson Rowe:

**SD3** Three fishermen each caught a fish. By a coincidence, each man plus his fish weighed 170 lbs. Pairing the men in turn, two men plus the third man's fish weighed 320, 322, and 324 lbs., respectively. What did the three men weigh?

**SD4** Finally, John E. Prussing wants you to show that the principal value of the  $i$ th root of  $i$  is a real number slightly less than 5.

## Solutions

**36** Show that the equations

$$a^2 + b^2 = c^{16}$$

and

$$a^{16} + b^2 = c^2$$

each have an infinite number of solutions with a, b, and c nonzero integers.

The following solution is from Frank Rubin:

First consider the equation

$$a^2 + b^2 = c^2.$$

It is well known that all solutions to this equation take the form

$$a = a_1^2 - b_1^2,$$

$$b = 2a_1b_1, \text{ and}$$

$$c = a_1^2 + b_1^2.$$

To achieve

$$a^2 + b^2 = c^4$$

we require that

$$a_1^2 + b_1^2 = c_1^2; c^2 = c_1^4.$$

So take

$$a_1 = a_1^2 - b_2^2,$$

$$b_1 = 2a_2b_2, \text{ and}$$

$$c_1 = a_2^2 + b_2^2.$$

Repeating, we would get

$$a_2 = a_3^2 - b_3^2,$$

$$b_2 = 2a_3b_3,$$

$$c_2 = a_3^2 + b_3^2,$$

$$a_3 = a_4^2 - b_4^2,$$

$$b_3 = 2a_4b_4, \text{ and}$$

$$c_3 = a_4^2 + b_4^2.$$

The minimum solution, derived from

$$a_4 = 2, b_4 = 1, \text{ is } 164,733^2 + 354,144^2 = 5^{16}.$$

The second half is much easier.

We simply take  $a_1 = 2^7 \cdot a_2^8$  and

$b_1 = b_2^8$ , reversing the roles of a and b.



The smallest solution in this case is  $2^{16} + 16,383^2 = 16,385^2$ , derived from  $a_2 = b_2 = 1$ .

Also solved by R. E. Crandall, Edward Friedman, Peter Groot, Donald R. Oestreicher, John E. Prussing, R. Robinson Rowe, and John Rudy.

**37** What is the smallest number (N) of n digits which, when removing the digit from the units place and relocating it in front of the n's place, exactly doubles the number?

James L. Funk submitted two solutions; here is his second—revised—answer: The general equation would be  $-10N(10^x - 2/19) + N(N < 9)$ . Divide  $10^x - 2$  by 19 backwards. The last digit must be 2 ( $38/19 = 2$ ). The next digit must be 4 ( $79/19 = 4 + 3/19$ ). The next digit must be 8 ( $159/19 = 8 + 7/19$ ). Continue to add 9's until you have no carry-over to the left. You will get: 5263157894736842. Substitute 2 for N to get: 105263157894736842; this is your answer.

Also solved by James R. Bledsoe, R. E. Crandall, William J. Deane, Edward Friedman, Peter Groot, Fred Heutink, Thomas Krause, D. C. Matiatos, Donald Oestreicher, S. Patten, Robert Pogoff, John E. Prussing, George Ropes, R. Robinson Rowe, Frank Rubin, John Rudy, Donald E. Savage, W. A. Smith, and S. D. Turner

**38** With bidding and lead as shown, how do you play the following hand to maximize the probability of making the contract?

North:	South:
♠ A Q J 8 5	♠ K 10 9 6 3
♥ A K 7	♥ 5 4 3
♦ A 7 5	♦ 9 6 3
♣ K 3	♣ A 2

The bidding: West, four clubs; North, double; East, pass; South, four spades; West, North, and East, pass. West opens with the ♣ Q.

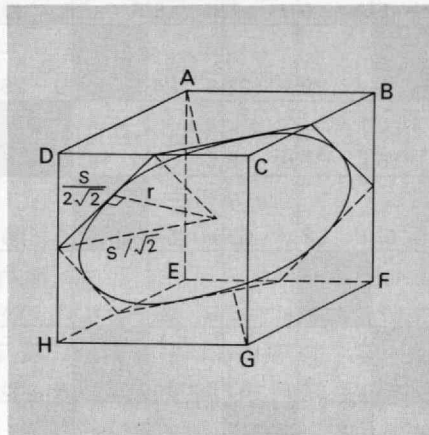
Elmer C. Ingraham submits the following: East will, of course, ruff the first trick, else there would be no problem. West will not, of course, ruff the second trick, else there would be no solution. So, you can maximize the probability of making your contract by planning the play to throw West into a forced club return upon which you can drop a loser from one hand while ruffing in the other for your tenth trick. So you win the second trick and count West's distribution; he never had but four cards beside his nine clubs and is pretty well marked with high diamonds to justify his bid. Plan your play to draw trumps and to observe West's play to those and to dummy's red aces; if West still has three red cards or has not thrown a high diamond it may be safe, and wise, to take dummy's ♥ K, thus assuring that he does not have a heart for safe exit. When West has only high diamonds left you can take your club trick and throw him in with the diamond, not caring whether he can win

one or two tricks. With luck you might even catch West with a single high diamond, ruff his club return in one hand and your small heart in the other to score an overtrick.

Also solved by Paul D. Berger, Edwin Davis, James W. Dotson, Edward Friedman, Peter Groot, Stanley Horowitz, Fred Price, R. Robinson Rowe, John Rudy, David Silberstein, and S. D. Turner.

**39** I want to send a record to a friend but don't want her to guess what's inside from the size and shape of the package. What's the smallest size cubic box that will hold a 12-in. record (without its jacket, of course)?

Robert Pogoff of Stewart-Warner Corp. offers the following:



The perpendicular bisecting plane of a diagonal of a cube intersects the face planes in lines which each bisect two edges, and which form a regular hexagon with side length  $s/\sqrt{2}$ , where s is the length of the edge of the cube. A circle inscribed in this hexagon will thus touch each of the faces of the cube. If r is the radius, then

$$r = s/2\sqrt{2} \cdot \sqrt{3}$$

$$s = (2\sqrt{2}/\sqrt{3})r = (4/\sqrt{6})r$$

$$\text{For the 12-in. disc, } s = (4 \cdot 6)/\sqrt{6} = 4\sqrt{6} = 9.796 \text{ in.}$$

Also solved by Norman L. Apollonio, Major F. H. Cleveland, R. E. Crandall, Peter Groot, R. M. Neudecker, Donald R. Oestreicher, A. Oltmann, R. Robinson Rowe, Eric Schaffer, C. Scholz, Robert D. Shooshan, W. A. Smith, S. D. Turner, S. Thomas Terwilliger, Benjamin Whang and Harry Gray, and "the Green Phantom."

**40** Three prisoners stand in a row, each facing the back of the one in front of him, the front one facing a wall perpendicular to the prisoners' line. The prisoners can neither turn around nor see their own heads. But they know that there are five hats, three red ones and two black ones; each prisoner is wearing a hat, and the remaining hats are hidden from view. If any prisoner can state the color of his own hat and provide sufficiently good reasons for his choice (law of averages excluded), he will be set free. After a

suitable time, the prisoner nearest the wall announces his answer, is correct, and is set free. How?

Nearly everyone solved this problem. Here is Heinrich Ruschat's answer: The prisoner nearest the wall waits a suitable period of time and when neither of the prisoners second and third from the wall states the color of his hat, the first prisoner knows that he has on a red hat. If the prisoner second from the wall looks forward and sees a black hat, he will know that he does not have on a black hat, for if he did, the prisoner third from the wall would have realized at once his hat must be red (since there are only two black hats) and would have called out at once, stating the color of his hat. Therefore, if the second prisoner doesn't hear a statement from the third prisoner, he will at once state the color of his hat as being red. If the prisoner second from the wall does not quickly state the color of his hat as being red, it is because he does not see a black hat on the prisoner in front of him. A suitable time passes, and in the silence of its passing the prisoner nearest the wall realizes his hat must be red.

Also solved by James R. Bledsoe, Sterling G. Brisbin, Jr., Thomas A. Casey, Jr., Craig F. Cheng, R. E. Crandall, Edwin Davis, James W. Dotson, Robert Epstein, James Flechtner, Edward Friedman, David Glazer, George Goodstein, Peter Groot, William Grosky, Peter Hall, Stanley Horowitz, Elmer C. Ingraham, Leon M. Kaatz, Thomas Krause, J. B. Linn, R. Lofredo, Dale Madden, William P. Mitchell, Donald F. Morrison, R. Neff, Donald R. Oestreicher, Stephen Perrenod, A. Porter, Fred Price, John E. Prussing, J. D. Ring, Eliot Roberts, R. Robinson Rowe, Frank Rubin, Greg Schaffer, C. Scholz, A. Roger Seymour, Robert D. Shooshan, David Silberstein, W. C. Sussky, S. D. Turner, Ralph Wanger, Benjamin Whang, Ronald E. Wilson, "the Green Phantom," and the proposer, John Rudy.

## Better Late Than Never

Solutions to two of last year's problems have arrived:

**16** Peter Lobban

**23** Donald Morrison and S. Thomas Terwilliger.

Allan J. Gottlieb received his S.B. degree in mathematics at M.I.T. in 1967 and has since been at Brandeis University, where he is now a teaching assistant in the Department of Mathematics. Send correspondence to him at the Department of Mathematics, Brandeis University, Waltham, Mass. 02154.

## October/November Crostic Solution

Spectrum lines serve not only to identify the atom by which they are produced, but also to tell a good deal about the circumstances of the gas in which they originated.

—P. W. Merrill, *Space Chemistry*.

# Vitamin B and the Writing on the Wall

	S	I	Y	2	Q	3		V	4	R	5	A	6	H	7	K	8	F	9	L	10	O	11	E	12		R	13	G	14	U	15	
O	16	K	17	C	18	Y	19	M	20	V	21		J	22	V	23	S	24		U	25	Z	26	P	27		H	28	N	29	Z	30	
K	31		O	32	M	33	E	34	X	35	Z	36	L	37	B	38	S	39	G	40		T	41	C	42	V	43	P	44	K	45		
U	46	F	47	Z	48	T	49		S	50	J	51	E	52	V	53	M	54		O	55	I	56	Q	57	C	58	F	59	U	60	A	61
W	62	L	63	Z	64	P	65		Y	66	H	67		M	68	O	69	F	70	T	71	P	72		G	73	Z	74	K	75	Q	76	
M	77	I	78	C	79		Z	80	O	81		V	82	J	83	Z	84		N	85	B	86	E	87	U	88	J	89	Y	90	R	91	
	E	92	Z	93	I	94	O	95		Y	96	X	97		A	98	B	99	T	100	I	101	Q	102	D	103	O	104	Z	105	J	106	
	V	107	O	108	D	109	J	110	B	111	G	112	Y	113	X	114	K	115		S	116	R	117		X	118	L	119	T	120			
G	121	A	122	N	123	Z	124	J	125	I	126	H	127	S	128	P	129		O	130	L	131		F	132	C	133	W	134	Y	135		

Use the definitions at the right to help define the words to which they refer; then enter the appropriate letters in the diagram to complete a quotation from a scientific work. The first letters of the defined words give the author and title from which the quotation is taken. Black squares in the diagram indicate the ends of words; when there is no black square at the right end of the diagram, the word continues on the next line.

The correct solution to this Tech-Crostic will appear in the January issue of *Technology Review*.

David L. Holt is Assistant Professor of Metallurgy at M.I.T. He will welcome readers' comments; address him in care of *Technology Review*, Room E19-430, M.I.T., Cambridge, Mass. 02139.

Names of the winners of the Anniversary Crostic Contest will appear in the January issue.

- |  |            |            |            |            |
|--|------------|------------|------------|------------|
| A. Engage.   | <u>61</u>  | <u>98</u>  | <u>6</u>   | <u>122</u> |
| B. Friable residue of a metal or mineral after calcination or combustion.                                  | <u>86</u>  | <u>38</u>  | <u>111</u> | <u>99</u>  |
| C. White crystalline material, soluble in alcohol; occurring in spermaceti with palmitic acid.             | <u>58</u>  | <u>18</u>  | <u>79</u>  | <u>133</u> |
| D. Theoretical force or natural power, supposed to be involved in hypnotism, magnets, etc.                 | <u>109</u> | <u>103</u> |            |            |
| E. Any fat or other ester possessing analogous properties.   | <u>12</u>  | <u>52</u>  | <u>34</u>  | <u>87</u>  |
| F. Pliant; flexible; limber.   | <u>132</u> | <u>47</u>  | <u>9</u>   | <u>59</u>  |
| G. To thicken and shorten by hammering on the end; to swage.   | <u>14</u>  | <u>121</u> | <u>73</u>  | <u>112</u> |
| H. First word seen by Nebuchadnezzar on the wall.  | <u>28</u>  | <u>7</u>   | <u>67</u>  | <u>127</u> |
| I. Compound derived from ammonia by replacement of hydrogen by one or more univalent hydrocarbon radicals. | <u>94</u>  | <u>126</u> | <u>56</u>  | <u>78</u>  |
|  |            |            |            | <u>101</u> |



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I certify that the statements made by me above  
are correct and complete.

John I. Mattill, Editor

J. Yellow River (2 words).

51 110 22 89 106 83 125

K. Take into the stomach.

17 8 75 115 45 31

L. Change; transfer.

63 119 10 131 37

M. Subject; essay.

20 54 68 33 77

N. Chemical suffix indicating that the  
substance is a carbohydrate.

29 85 123

O. Vitamin B<sub>2</sub>.

16 104 55 130 81 95 11 69 32  
108

P. Ferment.

72 27 129 65 44

Q. Foretoken; foreboding.

57 76 3 102

R. After *the*, low-lying districts in Lincoln-  
shire and some other English counties.

117 91 13 5

S. English mathematician and natural  
philosopher, 1642-1727.

39 24 50 1 116 128

T. King of Britain and father of King  
Arthur.

41 100 49 120 71

U. Low chirping note.

15 46 60 88 25

V. Dietary disease of infants and children.

23 43 53 107 4 82 21

W. Island near Marseilles, site of fortress-  
prison.

62 134

X. Chinese secret society.

118 35 97 114

Y. Motto of the Prince of Wales (2 Ger-  
man words).

66 90 2 113 96 135 19

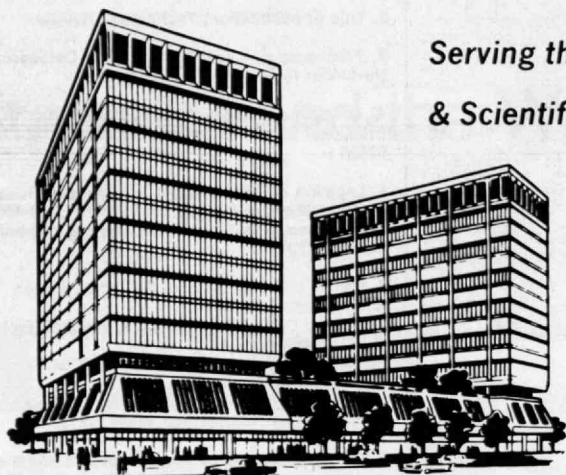
Z. Assault; beginning.

80 105 30 93 48

Z<sub>1</sub>. Situated down or below; lower; under.

124 74 64 26 84 36

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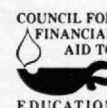
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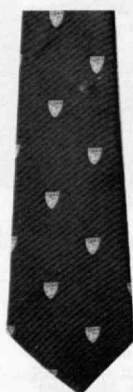


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TR-370



# Institute Review

## The Presidency: A New Man for "The Place Where the Buck Stops"

A unique self-exercise in defining its new leadership needs and seeking the leader to fill them is now a major preoccupation in the M.I.T. community. Two central questions emerge: Can the duties of the President be reduced without correspondingly diluting his power? And, having succeeded in broadly involving students, faculty, and even staff in discussing job specifications, can the committees concerned retreat into the privacy which is required for "such difficult and delicate matters" when the time for naming the name arrives?

These were the issues stressed by James R. Killian, Jr., '26, Chairman of the Corporation, at the first meeting this fall of the Corporation's Joint Advisory Committee on Institute-Wide Affairs (C.J.A.C.), through which open discussion of the issues raised by Howard W. Johnson's resignation from the Presidency effective next June 30 (see *Technology Review* for October/November, 1970, pp. 96A-96D) is focused.

Meanwhile, students and faculty are separately marshalling opinion from their constituencies on both the responsibilities of the M.I.T. Presidency and who its new occupant should be. The faculty group advising the Corporation Committee on the Presidency is led by Patrick M. Hurley, Ph.D.'40, Professor of Geology; its members—drawn from each school in a ratio approved by the faculty at its first meeting—include Samuel W. Bodman 3rd, Sc.D.'65, Associate Professor of Chemical Engineering; Eric R. Cosman, '63, Assistant Professor of Physics; Richard L. DeNeufville, '60, Associate Professor of Civil Engineering; John M. Deutch, '61, Associate Professor of Chemistry; Peter Elias, '44, Cecil H. Green Professor of Electrical Engineering; Morris Halle, Professor of Modern Languages; Willard R. Johnson, Associate Professor of Political Science; John D. C. Little, '48, Professor of Operations Research and Management; and Henry A. Millon, Professor of the History of Architecture.

No similar student committee was provided by the M.I.T. Corporation in the



President Howard W. Johnson's resignation presents the M.I.T. community with two challenges: to redefine the job of being President, and to find a man to fill that job. The Corporation's Joint Advisory Committee began to bring community opinion to this task with an unusual session (left) at which James R. Killian, Jr., '26, Chairman (foreground), Jerome B. Wiesner, Provost (profile), and President Johnson described their jobs as they see them. Meanwhile, student members of C. J. A. C. posted the crucial questions on corridor boards where students could write answers. The result was a good deal of rather poor collegiate graffiti—and some thoughtful comments (below).

Should the new President be from within M.I.T.?

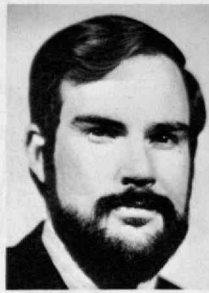
The president should probably have been at M.I.T. before, so that he knows how things work here. More importantly, he should be one with an eye on the larger global consequences of his decisions here. He should understand that it is not economical to make a local, short-term profit at the expense of the death or enslavement of people or of the planet.

Do you think it should be easier to talk to the President?

The problem is not whether it should be easier to speak to the President but whether he is the one to speak to.



W. M. Young, Jr.



R. M. Davison, '66



C. B. Simonedes



E. B. Skolnikoff, '49

machinery it designated for advising its own Committee on the Presidency, and student members of C.J.A.C. under Randolph G. Hawthorne, '70, are now developing student-based activities to be reported to C.J.A.C.

#### Toward Greater Decentralization?

Though the need to find the new man for the job hangs heavily over all concerned, the first assignment as outlined by President Johnson in his retirement statement is to restudy the responsibilities of the Presidency so that its new tenant can be fully effective on the major issues before M.I.T.

At C.J.A.C.'s second meeting, President Johnson gave a four-part "job description" of the Presidency as he has practiced it:

1. Educational management and development—fostering improvements in existing academic programs and developing new programs for new needs.
2. Chief executive officer—formulating operating policies and directing staff people in their execution.
3. Financial management and resource development—the allocation of capital and operating funds, the efficiency of their use, and the development of additional sources. In this category, said Mr. Johnson, falls the President's "major responsibility for an institution's future growth and stability."
4. Spokesman for the institution for its many publics—to explain and interpret what it is doing and what are its aspirations.

"I think the President must understand the strivings, hopes, and purposes of everyone in the organization," President Johnson told C.J.A.C. at its first meeting. Having understood "what human beings are about," he must then use this understanding to chart "the long-run educational contribution this kind of institution can make to technology," and finally he must identify and support "programs that will make the institution not a caretaker but an innovator."

"That's a long day," said President Johnson. "My own judgment is that we'll need a greater decentralization—to schools, departments, and laboratories."

Dr. Killian agreed, emphasizing that because there are so many different constituencies, "I know of no place where the functions of the chief executive are so broad as in the university." And M.I.T., he said, "may well be the largest institution in the country with a single faculty and a single administration." It is an arrangement that makes us "very fast on our feet" with decision-making, Dr. Killian noted. But in a period when decision-making is ever more complex it raises two questions: "Can we grow still larger and maintain this single administrative structure. How can we build in more opportunities for consultation and still maintain our decisiveness and ability to act without parochialism?"

Indeed, said Dr. Killian, who has been a member of the M.I.T. administration for more than 30 years, there has to be a single chief executive—"the place where the buck stops."

#### Two Corporate Landmarks

Even as its first woman member (Mrs. Philip F. Wagley, '47, Headmistress of St. Paul's School for Girls, Baltimore) was attending her first meeting, the M.I.T. Corporation this fall elected the youngest member ever to join the Institute's "board of trustees" and its second Negro member.

The two are Ralph M. Davison, '66, Research Engineer with Climax Molybdenum Co., and Whitney M. Young, Jr., Executive Director of the National Urban League.

Mr. Davison received the Sc.D. from M.I.T. in the Department of Metallurgy and Materials Science in June, 1970; his thesis was on carbide-dispersion-strengthened chromium-base alloys. As an undergraduate from San Antonio, Texas, Mr. Davison held a McDermott Scholarship throughout his undergraduate years at M.I.T., and he was awarded a departmental prize for his undergraduate thesis in 1966; as a graduate student he was President of the Graduate Student Council for 1969-70 and a member of the Corporation Joint Advisory Committee on Institute-Wide Affairs.

Mr. Young attended M.I.T. in 1942-43 as

a member of an Army student group studying electrical engineering following his graduation from Kentucky State College in 1941. After World War II he completed graduate work for the M.A. at the University of Minnesota and worked on urban problems in St. Paul and Omaha before 1950, when he became Dean of the School of Social Work at Atlanta University. He has held his present post since 1961 and has also served on a number of governmental and private commissions and boards concerned with major social problems. He is the author of *To Be Equal* and *Beyond Racism*.

#### Liaison Vice-President

Constantine B. Simonides, who has been Assistant to the President since the appointment of Howard W. Johnson as President of the Institute in 1966, has assumed additional responsibilities as Vice-President of the Institute. He will work with senior officers of administration in coordinating activities of the various councils and of staff groups convened by the President and Provost.

For example, said Mr. Johnson in announcing the appointment, Mr. Simonides, as Vice-President, will carry "direct liaison responsibility" with the Commission on M.I.T. Education as well as with other groups "to ensure prompt and responsive action on recommendations for improvement of our academic and administrative organization."

Mr. Simonides studied at Boston University (B.A., 1958) and the Harvard Business School (M.B.A., 1960). He came to the Institute as Assistant to the Director of the Summer Session in 1960 and joined the Sloan School of Management in 1962, first as Assistant Director of International Programs and later as Assistant Dean.

#### Political Science Head

Eugene B. Skolnikoff, '49, Professor of Political Science whose special field of interest is science policy and national scientific development, has succeeded Robert C. Wood, now President of the University of Massachusetts, as head of the Department of Political Science.





The late Samuel C. Prescott ('94) was chosen this fall by *Canner/Packer* magazine as "the most distinguished contributor to twentieth-century food processing"; and to symbolize the selection, Thomas J. Serb, Editor of the magazine, gave M.I.T.—where Dr. Prescott was a member of the faculty and Dean of the School of Science for 47—this abstract sculpture.

Professor Skolnikoff's S.B. and S.M. (1950) degrees from M.I.T. are in the field of electrical engineering. He then studied for two years at Oxford University as a Rhodes Scholar, returned to M.I.T. as a member of the Industrial Liaison Office staff for three years, completed his military service at the Institute for Defense Analyses, and was a member of the staff of the Office of the Special Assistant to the President for Science and Technology from 1958 to 1963. He received his Ph.D. in political science in 1965 at the Institute and joined the faculty of the Department in 1966.

Professor Skolnikoff is a founder and Chairman of the Science and Public Policy Studies Group, a national organization affiliated informally with the American Association for the Advancement of Science; he is a member of a number of national committees and boards—including the Editorial Advisory Board of *Technology Review*, and he is the author of *Science, Technology and American Foreign Policy* as well as a number of articles and papers.

### M.I.T. First in Federal Support

During fiscal 1969, M.I.T. was the nation's largest university recipient of federal funds, with grants totalling \$97.6 million. Harvard ranked second among university recipients.

This was the sixth consecutive year that M.I.T. has placed either first or second on the list of the country's largest university recipients of federal money.

The National Science Foundation, reporting on its annual survey, said \$88.5 million of M.I.T.'s total went for research and development; this was 6 per cent of the government's \$1.5 billion research and development support in higher educational institutions. The top 100 universities received a total of \$2.38 billion, or 69 per cent of the total federal funds to colleges and universities.

For the second consecutive year, said the N.S.F. report, federal support to colleges and universities increased by only 2 per cent in fiscal 1969. This compares with what N.S.F. called "a steep climb of nearly 24 per cent average

annual growth rate" from 1963 to 1967. And while the amount of funding for academic science has been increasing every year (from \$1.32 billion to \$2.36 billion), its percentage of the total declined from 94 to 68.

Massachusetts ranks third among the states—after California and New York—in federal funds to higher education. In addition to M.I.T. and Harvard, the "top ten" institutions included the Universities of Michigan, Washington, California (Los Angeles), Columbia, Wisconsin, Stanford, California (Berkeley), and Minnesota.

### Honoring Underwood, Prescott, M.I.T., and von Sydow

An original glass and ceramic sculpture—an abstraction of two interlaced bowls—has come to M.I.T. in honor of the late Samuel C. Prescott ('94), *Canner/Packer* magazine's choice for "the most distinguished contributor to twentieth-century food processing."

The award came to Dr. Nevin S. Scrimshaw, Head of the Department of Nutrition and Food Science, from Thomas J. Serb, Editor of *Canner/Packer*, during the luncheon convened for the eighth presentation of the Underwood-Prescott Memorial Award on September 24 at M.I.T. The Underwood-Prescott Memorial, a joint project of the M.I.T. Department and the William Underwood Co., went to Erik von Sydow, Director of the Swedish Institute for Food Preservation Research, Goteborg, for contributions in the field of flavor chemistry.

Speaking at the luncheon, Howard W. Johnson, President of M.I.T., announced that over \$400,000 of the \$600,000 needed to establish the Underwood-Prescott Professorship in the Department had been received, leading him to hope that the fund could in fact be completed by the end of the current academic year.

All luncheon speakers joined in praising the work of William Underwood and Dr. Prescott, who in M.I.T. laboratories in 1895 determined that spoilage in canned foods was due to microorganisms and established time and temperature guides

for destroying the spore-forming organisms.

After 37 years' service in the M.I.T. Department of Biology, beginning in 1895, Dr. Prescott became the Institute's first Dean of Science in 1932. He retired in 1942 but remained active in professional work at M.I.T. almost until his death in 1962.

### Alumni in Who's Who

One out of every 64 Americans listed in *Who's Who* for 1970-71 (Volume 36) is an alumnus of M.I.T., according to figures compiled by Vincent A. Fulmer, S.M.'53, Vice-President and Secretary of the Institute. The oldest is astrophysicist Charles G. Abbot, '94, the youngest Anthony W. England, '65, N.A.S.A. astronaut.

M.I.T.'s contingent of 1,060 *Who's Who* biographees represents 1.65 per cent of the 64,000 names in the book, though the Institute's 57,000 alumni are only about 0.3 per cent of the nation's college alumni, according to Mr. Fulmer's data. The Class of 1940 leads with 55 members in *Who's Who*; following in order the Classes of 1941, 1948, 1949, and 1933. The list includes 115 alumni who are now members of the M.I.T. faculty and staff.

Though most alumni biographees in *Who's Who* are engineers and scientists, architecture and planning is by far the leader in terms of the proportion of M.I.T. graduates selected for listing by the publishers. Only two alumnae of the Institute are included in *Who's Who*, a number which, Mr. Fulmer says, "fails in many ways to reflect the substantial number of M.I.T. alumnae who have achieved national distinction in a wide range of professions and organizations.

"A comparison with earlier *Who's Who* volumes indicates that the principal growth in the number of M.I.T. biographees in the current volume has come through the expansion of the Graduate School beginning with Karl T. Compton's presidency," Mr. Fulmer writes. But he adds a special statistician's note: "Interesting as these figures are, it is important to realize that they are only statistics, not people."

# The Post-Vietnam Generation . . .

"I was the last of the conservatives."

This is not the statement of a middle-aged Goldwaterite. It is an M.I.T. junior trying to describe what he perceived had happened to his high school since he graduated from it in 1967—and, by extrapolation, what he perceives the freshmen who enter M.I.T. this year are like.

"After me," he said, "there was chaos."

"When I go back to see my old math teacher, she says she can't wait to retire. The kids have all changed. They're so much more aware, and there are so many more of them. And the whole drug thing. She says our class was her last good class."

Rising political awareness and changing life styles are phenomena which have altered high schools everywhere. More students in high school and junior high school are getting more sophisticated at a younger age. As one college administrator put it, "The generation gap isn't any longer at age 30—it's between the college freshman and the sophomore."

But to the old saw which alumni and parents hear every year—this year's class is smarter than all their predecessors—there is a new twist. Freshmen may be getting smarter and more sophisticated, but they are now less politicized, less traumatized by issues such as the Vietnam war. This year's freshmen, says a member of the Dean's office staff at M.I.T., are part of the post-Vietnam generation.

## Born Ten Years Too Late

Psychiatrists and others who know about such things are advancing a chronology of this year's college freshmen's generation. Crudely, it runs like this. Today's freshman was born after the Korean War was over. He was only eight when J.F.K. ran for the Presidency and a busy 11 when President Kennedy was assassinated. If he was busy at 11, he was three times as busy at age 13 when President Lyndon Johnson began the bombing of North Vietnam—the event which so deeply affected the 20-year-olds then in college. And imagine being Sweet Sixteen going to

your first high school formal when President Nixon announces his timetable for withdrawing troops!

To those who are tired of hearing that it's a new generation, we apologize. But once again, it is a new generation.

## Love Songs Instead of Revolution

Listen to some of this year's freshmen talk about high school. Events which would have been the making of any good liberal-radical-change-the-system activist in the 1960's have somehow failed to galvanize this group.

◇ "For the strike over Cambodia last May we had a school assembly. There were a lot of speeches and then someone ran up to the podium and called for a motion to strike and everyone voted to strike and went marching down the halls.

"As it turned out, the next day, they found a script near the podium. The whole thing was rehearsed, rigged. It was a big joke!"

◇ "For the October Moratorium, I was a member of the organization which the principal said should decide what to do. But he also appointed a Faculty Senate, too, to work with us. The whole idea became so perverted; it just passed away completely from the ideas of the Moratorium. The thing was torn to pieces; there wasn't anything left of it.

"I was mad, so I just went home. I said I wasn't going to stay around here for this kind of baloney. It was held and it was over, and that was that. Nobody missed me."

◇ "I used to think that a lot of answers could be found by crusading around and all that garbage. But it's been ten years now, and it hasn't done a damn thing. And why should it? Why should working for a new Congress suddenly get us out of Vietnam? Why should cutting your hair bring about a new Congress? So Bob Dylan sings about love instead of revolution."

◇ "There are people who are finding happiness by not changing society but by going off by themselves. I think

communes are getting to be the thing. There are some people in my high school who wanted to start one. There's some here. I think we'll have more and more of them." Another says, "Right now you couldn't talk me into living in most dorms or fraternities. Especially coming from an all-male high school, and suddenly being exposed to a whole pile of things, including women's liberation, which you were never exposed to at all really. It's just totally on. It's a whole new world, and I like it very much. Ideally, our living group is supposed to be a commune."

## Failing to Manufacture Snow

There have been some unusual—if not disturbing—symptoms at M.I.T. this fall. One is a decreased interest in student activities. The ever-popular Urban Action Organization (see *Technology Review for October/November, 1969, pp. 104-105*)—which has annually counted more than 100 new volunteers in the last few years to tutor underprivileged children, staff teen centers, and do other social work in the Boston area—this year drew only a dozen to its first meeting. And *The Tech*, a student-run newspaper, which normally would look over ten freshman faces and turn maybe three into student reporters, has only three freshmen to start out with. The Movement for a New Congress (see *Technology Review for October/November, 1970, pp. 106-107*), which had been expecting to draw plenty of campaign workers from the freshman class, recruited for an entire weekend and produced only one volunteer.

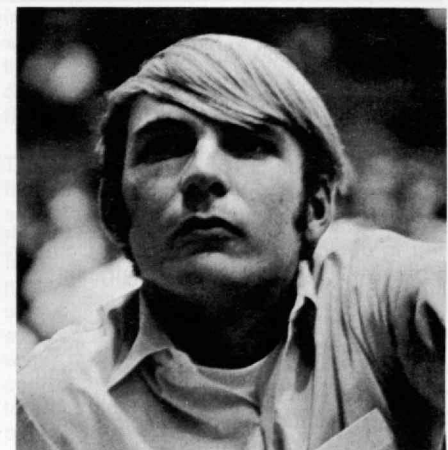
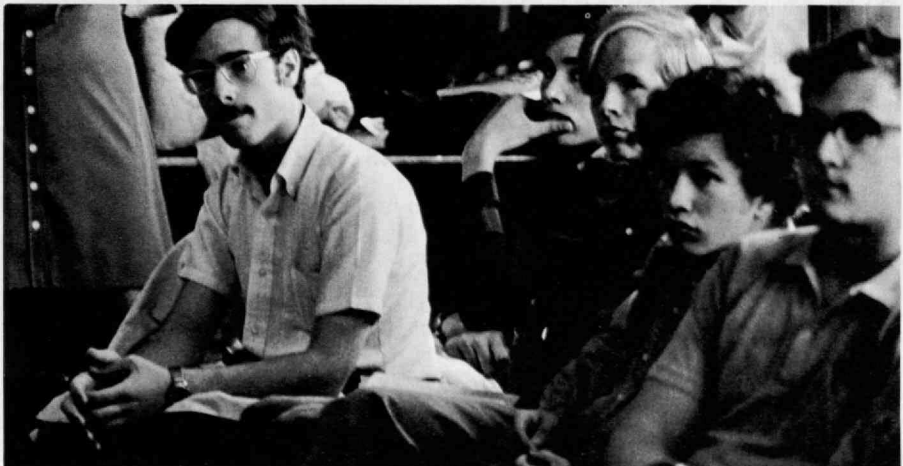
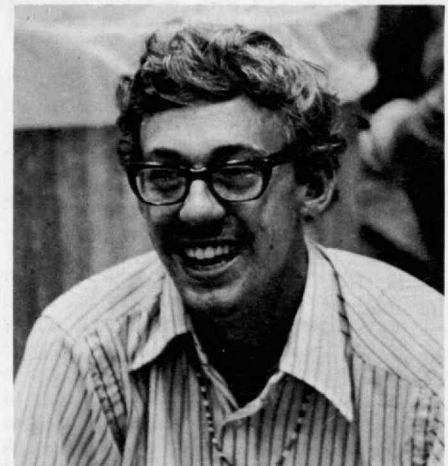
The mood of the Institute is changing. One senior says, "Things are slipping back. The last couple of years have been an exciting time in which to live. It's my sense that people have just retired back into a really dead apathy.

"This is true all over the Institute. Hacking—doing things like painting the Great Dome orange for HoJo—is down. Or like the time some kids in Baker House carried in a lot of snow and turned on the showers so steam came out the windows—and then called the papers to say M.I.T. students were manufacturing

(continued on p. 86)



New faces of 1970: Deborah Shapley, Associate Editor of the Review, writes that the Class of 1974 which entered M.I.T. this fall is part of "the post-Vietnam generation. . . . Imagine being Sweet Sixteen going to your first high school formal when President Nixon announces his timetable for withdrawing troops! . . . Events which would have been the making of any good liberal-radical-change-the-system activist in the 1960's have somehow failed to galvanize this group." (Photos: Owen D. Franken, '68)



*M.I.T.'s celebration of the new Ralph M. Parsons Laboratory for Water Resources and Hydrodynamics began when President Howard W. Johnson opened a two-day symposium on the Water Environment and Human Needs (right) and ended with a reception in the new Laboratory (opposite, bottom). In between there were reunions of hydraulics alumni; an address by Peter S. Eagleson, Sc.D.'56, Head of the Department of Civil Engineering; and a presentation to Arthur T. Ippen, Institute Professor who is Head of the Department's Division of Water Resources, from Donald R. F. Harleman, Sc.D.'50: letters from students and colleagues to celebrate the completion of M.I.T.'s new facilities.*



snow in their dorm. That kind of thing is dying out. There's a feeling of why bother. If you sit down and don't do much you can get out of this place, so why bother?

One freshman says, "I'm here to get a piece of paper, that's all. I could learn all this stuff sitting in a library for four years. I'm here because that piece of paper will enable me to do more things, later on. M.I.T. is just a school. It's not a holy institution."

Another freshman, speaking in the fifth week of his experience at M.I.T. and praising his work as part of the Experimental Study Group, yet talks about the possibility that he'll leave M.I.T. "It's hard to attach myself to anything here." There's nothing here that really makes me want to stay. There are a couple of things I wouldn't want to leave—my living group, maybe. But nothing that makes me want to stay."

Does a post-Vietnam generation really exist? Will these early signs change after the election, or with some galvanizing event on the national scene? Will they change after more time at M.I.T.? Is this mood the product of students' high school experience, or of their first encounter with the Institute? Only on June 15, 1974, when these students graduate, will they, and we, know for sure.—D.S.

### **The Parsons Laboratory: New Power for Water Resources**

M.I.T.'s Hydrodynamics Laboratory, first completed in 1950, has been more than doubled in size to accommodate a greatly expanded program of research on the water environment and has been renamed the Ralph M. Parsons Laboratory for Water Resources and Hydrodynamics.

In announcing the renaming of the building at dedication ceremonies on October 2, James R. Killian, Jr., '26, Chairman of the Corporation, said that generous support from Mr. Parsons had made possible the modernization of the laboratory. "As an engineer, he has acted with understanding and foresight," Dr. Killian observed, "to permit the further development of teaching and research

in the field of water resources at M.I.T." Mr. Parsons is Chairman of the Board of the Ralph M. Parsons Co. of Los Angeles, a principal construction and engineering firm.

Charles L. Miller, '51, former Head of the Department of Civil Engineering who is now Associate Dean of the M.I.T. School of Engineering, called the new laboratory "a powerful resource" in developing the alternatives needed to solve water resources problems "at a time when the cost of these services is increasing much more rapidly than their quality and than our expectations of their increasing quality."

Robert C. Dean, '26, of Perry, Dean and Stewart, was architect for the reconstruction project; Monahan Corp. of Boston were general contractors. The cost was over \$1.5 million.

Since 1950 the Hydrodynamics Laboratory has developed research on wave behavior and action on structures, coastal and harbor studies, and research on heat pollution, groundwater resources, hydrologic systems, sediment erosion and deposition, and other problem areas. The space now added will increase facilities in water resources planning and engineering, including a major analysis of estuary behavior with regard to tidal flows and dispersion of salinity and pollutants under the Sea Grant Program at M.I.T. More than 60 faculty and students will now work in the building.

Mr. Parsons, whose name is honored on the new laboratory, has been a leader in water resources development as well as in engineering in mining, Oil refining, and other fields. He has been a member of the Visiting Committee for the Department of Civil Engineering for seven years, and he is also associated with Woods Hole Oceanographic Institution, Webb Institute of Naval Architecture, California Institute of Technology, Harvey Mudd College, and Pratt Institute (from which he holds an honorary degree).







*The principals in the dedication of the new Ralph M. Parsons Laboratory for Water Resources and Hydrodynamics pose in the enlarged facilities: (left to right) President Johnson, Mr. Parsons, Jerome B. Wiesner, Provost of M.I.T., and Professor Ippen.*



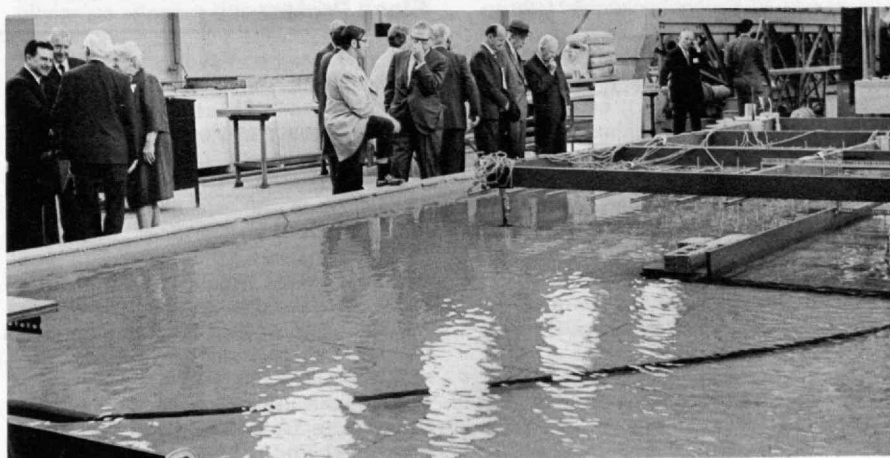
## **People, Water, and Technology**

Twenty years ago, when M.I.T. dedicated its Hydrodynamics Laboratory, the symposium was named "hydrodynamics in modern technology." This year it was "the water environment and human needs."

The titles themselves reveal how engineering has changed in the two decades since 1950—from an engineering science which was itself a major advance over the previous empirical approach, to an effort to meet social needs on the basis of technology even though some of that technology is still largely unknown, said Arthur T. Ippen, Institute Professor and Professor of Civil Engineering, at the banquet of the symposium to mark the dedication of the Ralph T. Parsons Water Resources and Hydrodynamics Laboratory (see above) on October 1.

As the symposium opened, Morrough P. O'Brien, '25, former Dean of Engineering at the University of California (Berkeley), began the recital of change by noting that the profession has come a long way since "hydroelectricity was hot stuff and the Reynolds number was good for a graduate thesis."

William R. Jobin, '59, who is Supervising Sanitary Engineer in the Massachusetts Water Resources Commission, guessed that he was the "first engineer to bring ecological issues into a hydraulics laboratory" when he made a study in the late 1950's at M.I.T. of the hydraulic forces on snails in moving streams of water. Now Mr. Jobin is working on political and engineering solutions to reduce pollution in the Charles River as it flows past M.I.T.



The interface at which technology and human affairs meet is still more directly seen in Israel, said Uri Y. Shamir, Ph.D.'66, a Senior Lecturer at the Israel Institute of Technology. He described the nationwide Israeli program to make most useful that country's limited water resources. Because the scale is small, the water resources few, and government control almost complete, modelling of the total national water system may in fact be possible for the first time, he said.

James R. Killian, Jr., '26, Chairman of the M.I.T. Corporation, pleased all the guests when he introduced 18-month-old John Etter as "the youngest water resources engineer in the audience" at the dinner of the symposium on the Water Environment and Human Needs at M.I.T. this fall. The proud parents are Mr. and Mrs. Robert J. Etter (S.M.'65) of Ellicott City, Md.



But, asked Frank E. Perkins, '55, Associate Professor of Civil Engineering at M.I.T., is man as a decision-maker an analyst, or an intuitist? Will our decisions in fact be better as we continue to increase our dependence on analysis?

And then there was Thomas A. Marlow, 2d, '55, Project Engineer at Bechtel Corp., describing how engineers incorporate fish ladders into dams on the Columbia River: "For a salmon, nothing works like water at eight feet per second." But, he added, "I'm terrified to see how often we forget we are people."

A very different emphasis was given by Richard M. Males, '63, of Engineering Science, Inc.: "The boundaries of a systems analysis problem tend to determine its solution," he noted. "So I seek especially to relate human needs to boundaries." Can we now think in terms of "modifying technology so it helps yield human behavior which is more consistent with our environment?" Can we now give technology the new assignment of determining behavior? For example, "Think how the electric car would have affected urban sprawl," he said.

### Wiener Professor

Isadore M. Singer, who has been a member of the M.I.T. faculty for 14 years and Professor of Mathematics since 1959, has been named to the Norbert Wiener Professorship, established to honor one

of the world's great mathematicians who was a member of the M.I.T. Department of Mathematics for his entire professional career, from 1919 until his death in 1964.

It is the first named professorship in the Department of Mathematics, and Robert A. Alberty, Dean of the School of Science, told the faculty in announcing Dr. Singer's appointment that its naming for Dr. Wiener is especially appropriate "because of the breadth and depth of his contributions to science, technology, and human affairs."

Professor Singer studied at the Universities of Michigan (B.S. 1943) and Chicago (M.S. 1947, Ph.D. 1950) before first coming to M.I.T., where he was C. L. E. Moore Instructor in Mathematics for two years. He then served on the faculties of the University of California (Los Angeles) and Columbia University and at the Institute for Advanced Study (Princeton) before returning to join the M.I.T. faculty as Assistant Professor in 1956. He has made what Dean Alberty described as "important discoveries" in several areas of mathematics, including differential geometry and function and operator algebras, and he holds the Bocher Prize of the American Mathematical Society for work on the indices of partial differential equations.

### Industrial Relations

Leslie M. Boring, '64, formerly Industrial Liaison Officer at M.I.T., has been named to direct the M.I.T. Associates Office, and James E. Fleischhacker, S.M.'68, has returned to M.I.T. from Sandia Laboratories to assume Mr. Boring's previous assignment in the Industrial Liaison Office.

Vincent A. Fulmer, S.M.'53, Vice-President and Secretary of the Institute, noted in announcing the new appointments that the two offices are responsible for separate, although related, programs to link the Institute with industry on the basis of technological developments and unrestricted financial support.

Mr. Boring has been associated with M.I.T. since first coming as an undergraduate in 1960; he received his S.M. degree in aeronautics and astronautics

in 1968, when he joined the Industrial Liaison Office after assignments in the former Instrumentation Laboratory and the Aeroelastic and Structures Research Laboratory. Mr. Fleischhacker's undergraduate work was at the University of Minnesota (aeronautics and engineering mechanics), and he has had research assignments in aeronautics at the University of Michigan as well as in applied mechanics at Sandia Laboratories.

### Admissions Appointments

The appointments of Cynthia C. Helgersen, '70, and Tekle Ab Kassaye Tomlinson as Assistant Directors of Admissions at M.I.T. became effective this fall. Peter D. Leavitt, formerly Assistant Director of Admissions, has been named Administrative Officer for Engineering Programs Abroad in the Department of Electrical Engineering.

Miss Helgersen, whose undergraduate degree is in the Department of Earth and Planetary Sciences, worked at the Center for International Studies during the summer and anticipates a career in the field of counseling. Mr. Tomlinson, a native of Ethiopia, has been a U.S. State Department interne and was Chief of Planning and Research for the Ethiopian Division of Posts, Telegraphs and Telephones before joining the Ethiopian embassy in Washington in 1963; his assignment in the Admissions Office will be in connection with advising foreign students.

### Sloan Professor

Mason Haire, who has been Professor of Organizational Psychology and Management since 1967, has been named Sloan Professor of Management. He succeeds Douglass V. Brown, now Professor Emeritus, who has held the chair since it was established by a gift from the late Alfred P. Sloan, Jr. ('95) in 1946.

Professor Haire first served at M.I.T. as Assistant Professor of Industrial Relations from 1946 to 1949; he returned in 1966 as Visiting Professor from the University of California (Berkeley). He studied at Swarthmore (A.B. 1937) and Harvard (M.A. 1940, Ph.D. 1942).



Windmills like this one—designed by M.I.T. mechanical engineering students for VITA—may soon be pumping over 4,000 gallons of water a day to dry and dusty farms in the Philippines. Charles Smith, '70 (right), led a student group under the direction of David G. Wilson, Associate Professor of Mechanical Engineering, in the design. (Photo: Ed Ferrand, Boston Globe)

Since 1967 Professor Haire has been leader of the Organization Studies Group in the Sloan School of Management, and in that capacity "has contributed substantially . . . by bringing about joint efforts in both teaching and research which effectively combine the insights of behavioral science with those in fields as apparently disparate as computer science, economics, and the mathematics of model building," according to the announcement by William F. Pounds, Dean of the Sloan School.

### Political Science Fellow

Edwin Diamond, known for many years as a leading science writer in the U.S., has been appointed a Senior Fellow in the M.I.T. Department of Political Science for the current academic year. He will teach in the field of communications.

Mr. Diamond studied at the University of Chicago and worked on the *Chicago American* and the *Washington Times-Herald* before becoming a science writer for International News Service. He was Science Editor of *Newsweek* from 1958 to 1962 and Senior Editor from 1962 until he resigned, in 1969, to devote his time to writing. Mr. Diamond now conducts a weekly series on press criticism for WTOP-TV, Washington, and he has written articles for a number of periodicals.

### Alumni Appointments

Fourteen alumni are among the appointees to new administrative and faculty posts effective this fall at M.I.T.

New faculty appointments include Harold Conroy, '48, Visiting Professor of Chemistry in the Department of Biology for the current academic year; Warren H. Hausman, Ph.D. '66, Associate Professor of Management; Ralph E. Beals, '62, Visiting Associate Professor of Industrial Relations for the current year; Arnold F. Stancell, Sc.D. '62, Visiting Associate Professor of Chemical Engineering for the current year; Francis M. McLaughlin, Ph.D. '64, Visiting Associate Professor of Industrial Relations for the current year; David G. Schaeffer, Ph.D. '68, Assistant Professor of Mathematics; and Kenan E. Sahin, '63, Visiting Assistant Professor of Management for the year.

Two administrative positions have been taken by alumni: Kendall B. Randolph, '56, is Special Assistant to the Head of the Department of Chemical Engineering and to the Vice-President and Secretary of the Institute; and John E. Jordon, '52, is Administrative Officer in the Department of Chemistry.

Five alumni have been promoted to assistant professorships: Thomas P. Gerrity, '63, in management; Robert Gilmore, '62, in physics; Timothy E. Johnson, S.M. '63, in mechanical engineering; Siegfried T. Mayr, Sc.D. '70, in chemical engineering; and Richard C. Tremaglio, '68, in architecture.

### Mills for Free Wind

In the small villages, or *barrios*, outside Ozamis City, Philippines, lots of water lies five or six feet underground. Last year, however, the farmers lost close to 90 per cent of their rice crop because there was no way to get the water.

Two thousand pesos (\$500) would be needed for a small diesel or gasoline motor to pump the precious water, more money than the farmers or the local Peace Corps volunteers could manage. Finally one of the volunteers, noting the brisk winds along the coastal city and remembering that air is free, wrote Peace Corps headquarters for information on windmill building. The Peace Corps forwarded the request to VITA (Volunteers for International Technical Assistance), an organization of people with technical skills who offer their spare-time talent to help underdeveloped countries. VITA handles many such requests; this particular one eventually involved a group of seven Boston area specialists, including David G. Wilson, Associate Professor of Mechanical Engineering, and one of his students, Charles Smith, '70, who graduated in June.

The windmill had to be cheap, easy to build, and efficient. The group designed one that used wood for the fan (the farmers of Ozamis City will probably use bamboo; the design is simple enough to allow the use of many different building supplies), a used Volkswagen engine for mounting it, and an old brake drum to



support them both. This spring, construction of a sample was carried out on M.I.T. property on a windy, green hill in Middleton, Mass. The prototype windmill—which can be constructed in under a week—worked well. The cost came to around \$200; a comparable manufactured one might cost \$1,000.

### The Seelenfreund Fund

Marc J. Seelenfreund ('68) graduated from M.I.T. in aeronautical engineering and enrolled for work toward a master's degree at Northwestern University, expecting to return to Cambridge for doctorate work at M.I.T. in 1969. Instead, he died in an automobile crash on the Ohio Turnpike in December, 1968; and when his heart was given to Wylie Juilliard of Babylon, N.Y., Marc became the world's 100th heart donor.

Now Marc's parents, Mr. and Mrs. Sol Seelenfreund of Fair Lawn, N.J., have turned over to M.I.T. the scholarship fund which Marc's New Jersey friends and neighbors established in his honor in December, 1968. Marc's parents

asked M.I.T. how the money could be used "to help perpetuate Marc's dream of a better world for all." M.I.T.'s suggestion, since accepted, was to add these tributes to the Institute's Fund for Special Financial Need, designed to help blacks and other disadvantaged students who require special financial assistance to attend M.I.T.

### **Beginning the Rebirth of Burton**

The long-promised renovations of Burton House, designed to make its accommodations fully comparable with those of newly built Institute houses, began in June and are scheduled for completion during the 1971-72 academic year.

The cost will be in excess of \$3.5 million—a figure far below the cost of new construction to provide comparable accommodations, according to Laurence H. Bishoff, '59, Assistant to the Vice-President—Operations. But the project will yield a new Burton House whose similarity to the old Burton-Connor will stop with the exterior walls and interior structural geometry. Everything else will be new.

When the job is completed, Burton House will accommodate 346 M.I.T. students in apartment-like units for from three to eleven residents each—compared with 520 students living in Burton House before June, 1970. Each "apartment" will include living room, bath, kitchen, and bedrooms—two-thirds of them singles, one-third doubles. The "apartments," in turn, will be grouped into nine small residential units, with each of which will be associated a larger lounge/seminar room and an apartment for a graduate student as Tutor.

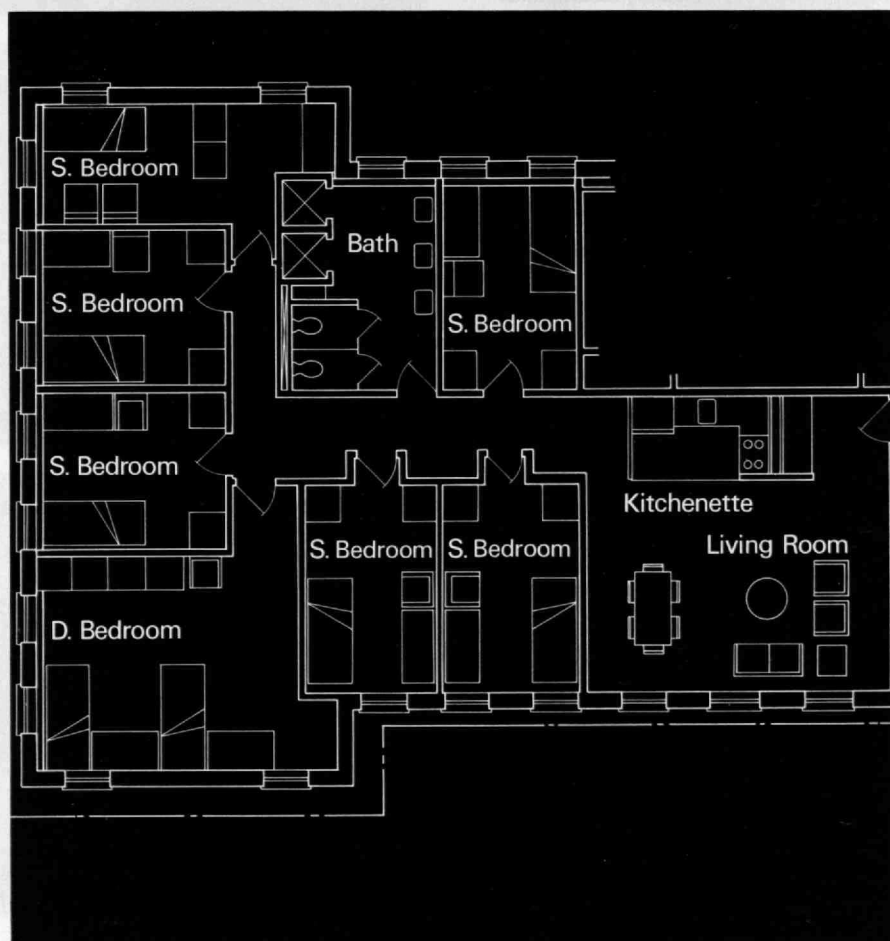
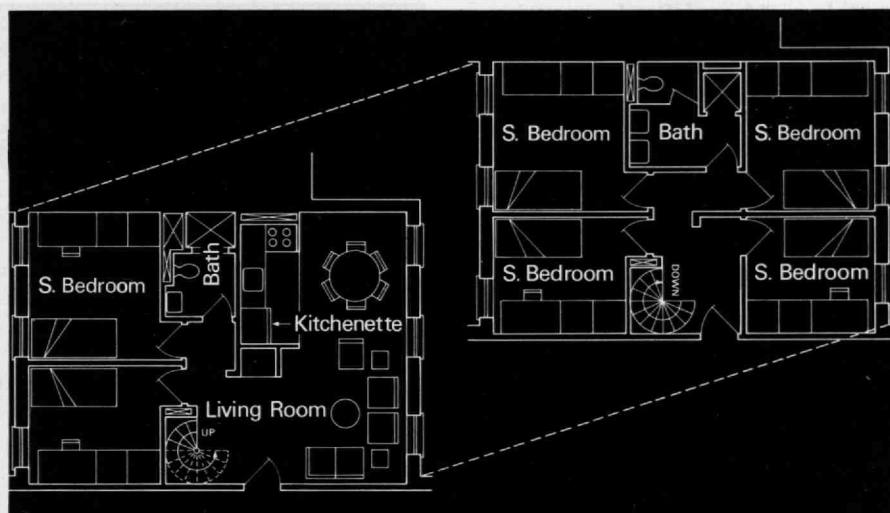
In addition, there will be apartments for a member of the faculty and his family as Master and a junior faculty member and his family as Senior Tutor. And there will be comprehensive common facilities—lounges, library, seminar room, computer room, guest apartment, darkroom, electronics and language laboratories, exercise room, and student and managers' offices.

Mr. Bishoff emphasizes the unusual role which students have had in determining





Though the "new" Burton House is about a year away, the "old" Burton House is nothing but a memory. The renovation now in progress will yield accommodations for 346 undergraduates in single and double rooms grouped into "apartments," each with kitchenette and living room. Among them will be a few of what Laurence H. Bishoff, '59, Assistant to the Vice-President—Operations, calls "real swinging pads"—units on two levels connected with their own private spiral staircase.



the plans for the renovation. A committee of Burton House residents worked closely with the architects, Marvin E. Goody (M.Arch.'51) and John M. Clancy ('56) and Associates, Inc., from the beginning of their assignment on Burton House in 1968; last year the working drawings were posted in the House as they were completed for further comments from all residents. The final plans reflect many students' views of "how they want to live," Mr. Bishoff says.

Turner Construction Co. is the general contractor for the renovation.

The provision of kitchens in the new student "apartments" does not indicate any immediate change in the "commons" meal plan for Burton House, though that program is now under review. Mr. Bishoff says; the "apartment" kitchens will simply provide adequate facilities for snacks and weekend meals which have heretofore been prepared from corridor refrigerators and bathroom sinks.

Remodeling Burton House has been a major goal in the Institute's student housing plans for many years. Its realization now results from the completion of MacGregor House, a new dormitory west of Burton House for over 300 undergraduates. Most of the students who formerly lived in Burton House will live in MacGregor in 1970-71 and part of 1971-72, and temporary housing is being arranged in the Boston and Cambridge communities for those who cannot be accommodated in MacGregor.

### New in the White House

Two M.I.T. alumni—George P. Shultz, Ph.D.'49, as Director of the Office of Management and Budget, and Edward E. David, Jr., Sc.D.'50, as Director of the Office of Science and Technology—are now in assignments as leading White House advisers.

Dr. Shultz, who was President Richard M. Nixon's choice as Secretary of Labor following the 1968 election, taught in the Industrial Relations Section and Sloan School of Management at M.I.T. before going to the University of Chicago in 1957, where he was Dean of the Graduate School of Business when tapped for the cabinet by Mr. Nixon.

The pictures do not—could not—reveal the special character of the 1970 Alumni Officers' Conference: alumni, faculty, and students joining to discuss the most urgent of the problems confronting M.I.T.—curriculum, finance, governance, relevance . . . even spirit. The pictures show President Howard W. Johnson's opening address (center), Warren K. Lewis, '05, Emeritus Professor of Chemical Engineering (center, left); Kenneth N. Hoffman, Chairman of the M.I.T. Commission (center, far right); Erwin D. Canham, Editor in Chief of the *Christian Science Monitor* (bottom, center); and A. Rufus Applegarth, Jr. '36, Conference Chairman (bottom, far right).

Though President Nixon says he "tracks well" with Dr. Shultz, most observers think the latter one of the most liberal Republicans among the top administration. Mrs. Shultz is quoted by A. H. Raskin in *The New York Times* as urging her husband to go to Washington because it would be "good for the other side to be in the White House." Mr. Raskin points out that Dr. Shultz's new job in what used to be called the Bureau of the Budget "is part of the most massive centralization of authority in the White House that has ever been undertaken"; but Mr. Raskin seems convinced that Dr. Shultz "is basically a believer in cutting down the role of government."

Dr. David inherits the desk occupied until September by Lee A. DuBridge, former President of California Institute of Technology, and—in the face of widespread concern for the declining role of science in White House decision making—has been cautious in public statements. His M.I.T. roommate, John G. Truxal, '47, who is now Academic Vice-President at Brooklyn Polytechnic Institute, recalled for *The New York Times* that Dr. David was "a very unusual graduate student. . . . He was so widely read in the humanities."

More recently, in connection with his involvement in a project called "Man Made World," Dr. David has been quoted: "It's vital that [citizens] understand and survive with technology. We can't leave science and technology to the experts." His goal is "to combine science and technology with the human factor in society." These interests—and other university and consulting assignments—were in addition to his primary responsibility as Executive Director of Communications Systems Research at Bell Telephone Laboratories, where Dr. David has been since 1952.

## A Unique Alumni Conference On the Issues in Education

James R. Killian, Jr., '26, Chairman of the M.I.T. Corporation, said the meeting was "unprecedented among alumni gatherings in its detailed review of the Institute's educational processes and their adaptation to human needs."

He was speaking of—and at—the 1970 Alumni Officers' Conference at M.I.T. on October 16 and 17, when more than 300 alumni club and class officers, members of committees, and Educational Counselors assembled in Cambridge to discuss the issues of Institute goals and methods with members of the prestigious Commission on M.I.T. Education.

Howard W. Johnson, President of the Institute, set the stage by noting that M.I.T. must live in what he called "the larger world."

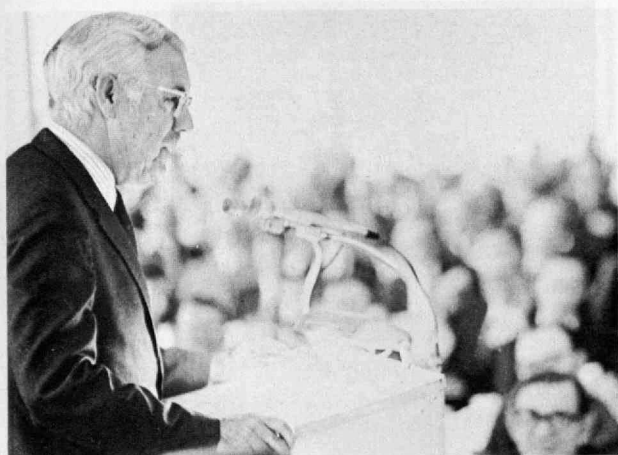
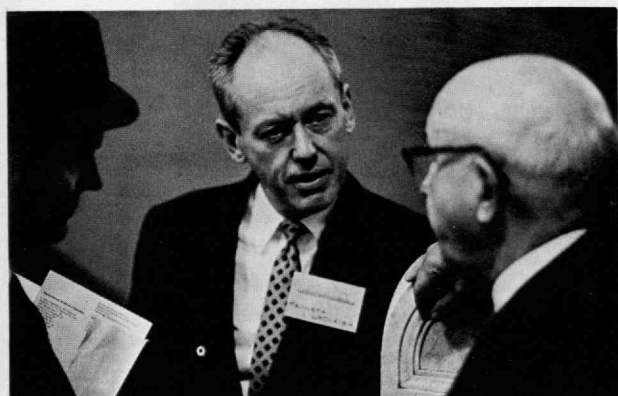
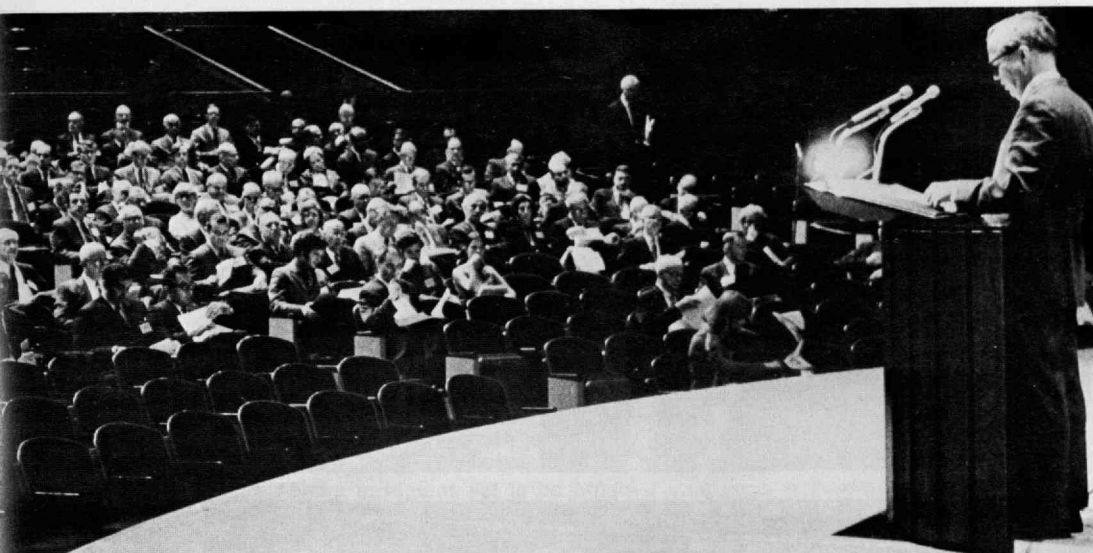
"There is no way to isolate the future of M.I.T. from the future of all universities and from the future of society," he said. "If the independence and vitality of the major institutions of the U.S. are now imperiled—as I believe they are—so are we." Hence President Johnson's emphasis on "M.I.T.'s potential for constructive change in serving society in the future."

Kenneth M. Hoffman, Professor of Mathematics who heads the Commission, raised with alumni in his keynote statement a series of questions with which the Commission itself has been dealing in the 12 months since its appointment. Among them: Do we share in fact a growing feeling of powerlessness over where our society is headed? Is such a feeling appropriate? Have we been educating true professionals, in the sense that they understand and are concerned for the consequences of their work as well as for its success? How can education be extended beyond the period when one is earning a degree? Can we view research in its broadest social context without ourselves becoming a political institution?

During the question period, William S. Edgerley, '49, who is Chairman of an alumni committee to advise the Com-







mission, pointed out at least four constraints which M.I.T. will sense in answering such questions as these: there are vested interests within the institution against which answers may mitigate; all parts of the community must somehow engage in the decision making which the questions imply; it is as important to cut back ineffective, established programs as to find new ones; and M.I.T. must remain in step with other educational institutions whose goals may be the same but methods very different. In other words, he said, "new initiatives are inevitably associated with new risks."

Other questions were raised by other participants:

Can we develop more effective means for making decisions, recognizing issues, and communicating ideas? If we can, said Eric L. Mollo-Christensen, '48, Professor of Meteorology, perhaps the present Commission may make future ones unnecessary.

Our central problem now is this, said Warren K. Lewis, '05, Emeritus Professor of Chemical Engineering: "Students trust feeling and they distrust reason." But this is contrary to our understanding of how technology has worked to affect the world.

Governance is more than authority and a place on the organization chart. It is understanding of decisions, not necessarily power over them. In this sense, how can students—who have interest but perhaps not expertise in issues to be decided—have a role in Institute decision-making? asked Gregory K. Arenson, '70.

This kind of question emphasizes the risk of giving votes to those in the academic community who are unknown and untried—such as students and alumni, said Thomas F. Jones, Jr., Sc.D.'52, President of the University of South Carolina. What we really need, he said, is a way to avoid "the dead-end pockets into which good ideas disappear."

If boards of trustees are policy-making bodies, they must somehow be drawn into a closer relationship with the institution as problems become more complex.

What should in fact be the level of their involvement? asked Jerome B. Wiesner, Provost. Can the Corporation, for example, be involved in the question of what sort of world we are preparing M.I.T. students for?

Noting M.I.T.'s great growth in the past decade, Philip H. Peters, '37, wondered if the Institute should perhaps follow industry's example in actively questioning its own efficiency and needs. Industry's index of value can be profitability; what is the educational institution's?

More than half of today's young people of college age are in fact in college, said Vannevar Bush, '16, Honorary Chairman of the Corporation. Must they be disappointed because so large a group cannot find positions of power in society in the conventional sense which college graduates expect? Or may we have a different concept of the function of the university and its education? Is it appropriate now to think of the university's duty as equipping a man to enjoy his life—whatever his station—because he has learned to pursue the really important things?

### For Excellence in Technology

Anticipating the discussion of the 1970 Alumni Officers' Conference (see above), ten Chicago-area alumni associated with the M.I.T. Club of Chicago have written to Kenneth M. Hoffman, Chairman of the Commission on M.I.T. Education, that the Institute's future purpose should be to meet the need for "engineers and scientists of increasing competence, and for outstanding managers of technology to deal with the compounding problems of tomorrow and to continue to advance man's frontiers."

Accordingly, they "view with concern" M.I.T. policies which may decrease the proportion of engineering graduates from the Institute, increase "the tendency towards the permissive climate of an unstructured curriculum," and "try to encompass the interests of the whole society."

The Institute's broad objective should remain, they say, to be "an institution 'polarized around science and technology,' dedicated to the highest standards of excellence, developing professional engineers, scientists, and managers for effective service to their society." They call for "a sharp, burning focus of excellence in the field of technology."

The statement is signed by Bennett Archambault, '32, Warren N. Barr, Jr., '49, Philip L. Coleman, '23, Harlan H. Davis, '40, Melvin L. Hurni, '58, F. Richard Meyer III, '42, Warren J. Meyers, '41, Randall S. Robinson, '55, Goff Smith, '53, and Karl R. Van Tassel, '25.

Among those present at the 1970 Alumni Officers' Conference—top: Anatol W. Bigus, '49, with Professor Hoffman (center) and Roy Lamson, Professor of Literature (right); center: Thomas F. Jones, Jr., Sc.D.'52, President of the University of South Carolina (center) with Donald P. Severance, '38, Executive Vice-President of the Alumni Association; bottom left: Paul V. Keyser, Jr., '29, President of the Alumni Association; and bottom right: Vannevar Bush, '16, Honorary Chairman of the M.I.T. Corporation. (Photos: Donald L. Estes, Jr., '71)





## Alumni Fund: Regional Plans and an Early-Season Record

While the 1971 M.I.T. Alumni Fund was reporting a new three-month record this fall, organization of the regional solicitation program to be conducted in April and May was a major effort at the Fund's Cambridge headquarters.

Paul V. Keyser, Jr., '29, President of the Alumni Association, announced to more than 500 guests at the Alumni Officers' Conference banquet on October 16 that the 1971 Fund then stood at \$314,984 from 3,664 donors—new records for the date in both categories. At the same time one year ago, the 1970 Fund stood at \$252,277 from 3,658 donors.

Meantime, Robert Hagopian, '47, Associate Director of the Fund, issued a progress report on organization for the 1971 regional solicitation—a phase of the Alumni Fund on which more than 1,000 alumni worked in 1970. Without their work last year, he says, the Fund's record of 20,461 donors might have been as much as 25 per cent lower. The 258 regions organized for solicitation last year averaged 70 per cent participation, while participation in areas not organized averaged only 51 per cent. The potential is much greater, says Mr. Hagopian; as many as 100 more regions could be organized.

The list below shows the present status of regional organization for the 1971 Fund. Alumni in regions yet to be organized are especially urged to use the coupon to indicate to Mr. Hagopian their interest in helping the 1971 Alumni Fund make a new record in support for M.I.T.

### Alabama

Birmingham—Edwin B. Miller '50  
Huntsville—Robert T. Howard, Jr. '42

### Alaska

### Arizona

Phoenix—Alan S. Kamin '63  
Tucson—

### Arkansas

Little Rock—

### California

Alameda County—Lee W. Sloan SE'66  
Anaheim—  
Beverly Hills—Justin J. Gershuny CE'53  
Contra Costa—Joseph P. McBrien '31  
Foothills—  
Long Beach—  
Los Angeles—Gates W. Burrows '25  
Manhattan Beach—Richard D. Brandes '57  
Marin County—  
Monterey—Rockwell Hereford '24  
Palo Alto—Roger S. Borovoy '56  
Palos Verdes—  
Pasadena—Lynwood O. Eikrem CM'48  
Redondo Beach—  
Sacramento—Claude J. Farinha SL'61  
San Diego—  
San Fernando Valley—Robert N. Gurnitz '60  
San Francisco—Lee W. Sloan SE'66  
San Mateo County—  
Santa Barbara—John R. Brennand Jr. EE'59  
Santa Clara County—John E. Bartelt '47  
Santa Monica—  
Solano County—  
Van Nuys—Glendale—  
Whittier—  
**Colorado**  
Colorado Springs—  
Denver—

Fort Collins—

### Connecticut

Bridgeport—  
Darien—  
East Hartford—David S. Shefrin '56  
Fairfield—George Jordan '52  
Greenwich—  
Hartford—David S. Shefrin '56  
Middletown—  
New Britain—Joseph H. Myers '41  
New Canaan—  
New Haven—Hillel J. Auerbach '58  
New London—  
Norwalk—David F. McGrath '26  
Old Greenwich—J. Edward Lynn '37  
Stamford—Robert S. Hess '40  
Stratford—  
Waterbury—George E. Westefeld '34  
West Hartford—David S. Shefrin '56  
Westport—Richard A. Rubino '52

### Delaware

Newark—  
Wilmington—

### District of Columbia

Washington—C. Haskell Small '30

### Florida

Brevard County—Peter K. Bradish '68  
Ft. Lauderdale—E. Franklin Badger '20  
Ft. Myers—  
Jacksonville—  
Miami—  
Orlando—Peter C. Hand '48  
St. Petersburg—  
Sarasota—  
Tampa—  
West Palm Beach—Alexander W. Dreyfoos, Jr. '54

### Georgia

Atlanta—Thomas E. Ambler 2nd '62  
Augusta—George L. Tuer Jr. '55

### Hawaii

Honolulu—Richard R. Lowe CP'61

### Idaho

Idaho Falls—Robert A. Cushman '51

### Illinois

Champaign—G. Howard Martin '53  
Chicago—  
Evanston—  
Highland Park—  
Hinsdale—James F. Hurley 3rd '59  
Oak Park—Ambrose W. W. Clay Jr. '64  
Park Forest—George M. Davis CH'56  
Park Ridge—Wesley H. Loomis III '35  
Peoria—B. Jan Huffman '66  
Rockford—  
Winnetka—  
**Indiana**  
Anderson—  
Evansville—Richard L. Murdock '58  
Fort Wayne—  
Indianapolis—Wendell J. Bridges AA'65  
Lafayette—Felix Haas '49  
Muncie—Karl L. Ford '18  
South Bend—Joseph C. Pitts EE'49

### Iowa

Des Moines—Gregor J. Gentleman, Jr. '51

### Kansas

Wichita—Robert B. Morgan '65

### Kentucky

Lexington—  
Louisville—Edward J. Schickli, Jr. '50

### Louisiana

Baton Rouge—David L. Ritter '63  
New Orleans—George J. Foundas '49  
Shreveport—

### Maine

Bangor—Richard C. Gibson '42  
Portland—

### Maryland

Annapolis—William T. Donahue Jr. '68  
Baltimore—Lars O. Soderberg '49  
Bethesda—George H. Berry '65  
Chevy Chase—Adolph C. Hendrickson '51  
No. Prince Georges County—Wilber B. Huston '33  
Rockville—William L. Glodt NC'49  
Silver Spring—Philip J. Bonomo AA'54

### Massachusetts

Acton—Cornelius Peterson '58  
Andover—

Arlington—

Attleboro—Daniel J. Hamilton '54  
Bedford—Robert E. Michaud '46  
Belmont—George E. Wetmore '50  
Beverly—John L. Kieley '53  
Boston—  
Braintree—  
Brighton—Robert A. Spitz '66  
Brockton—  
Brookline—Ronald A. Shulman CH'57  
Burlington—Milton A. Jones '58  
Cambridge—  
Cape Cod—  
Carlisle—Gorton—Paul E. Lambert '63  
Chestnut Hill—Eugene R. Eisenberg '43  
Cohasset—Philip N. Bowditch '46  
Concord—Frank H. Scammell '55  
Dedham—  
Dorchester—  
Dover—James W. Storey '55  
Duxbury—  
Everett—  
Fall River—Lester Glickman '32  
Falmouth Islands—  
Fitchburg—  
Framingham—  
Gloucester—  
Hingham—  
Holliston—John R. Greenwood 3rd '60  
Holyoke—  
Hopedale—Charles A. Martin '62  
Hudson—Robert Veo '53  
Hyde Park—  
Jamaica Plain—  
Lawrence—Kenneth L. Macoul '61  
Lexington—Robert R. Batchelder '57  
Lincoln—Edward G. Najjar '56  
Longmeadow—  
Lowell—  
Lynn—  
Lynnfield—  
Malden—  
Marblehead—  
Medford—Joseph P. Blake Jr. '54  
Melrose—  
Milton—  
Natick—Philip A. Untersee '55  
Needham—David C. Crocker '52  
New Bedford—  
Newburyport—John W. Kilduff '18  
Newton—  
Newton Centre—Melvin H. Berkowitz '48  
Newton Highlands—Raymond H. Danon '58  
Newtonville—  
Norwood—Hans H. Hoefflein '56  
North Adams—Francis G. Jenkins '34  
Pittsfield—  
Quincy—  
Reading—  
Rockland—David R. Ludwig '59  
Scituate—  
Sharon—Edgar H. Bristol 2nd '57  
Shrewsbury—Richard H. Harris '48  
Somerville—  
Springfield—Carroll I. Johnson '50  
Sudbury—

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Waban—Theodore H. Korelitz '56  
Wakefield—  
Waltham—Lionel C. Kimerling '65  
Watertown—Martin J. O'Donnell '58  
Wayland—  
Wellesley—John T. Hughes, Jr. '60  
West Newton—  
Weston—  
West Roxbury—  
Westwood—  
Weymouth—Alfred Young Jr. '50  
Winchester—Robert H. Murphy '55  
Winthrop—  
Worcester—Arnold A. Kramer '52

## Michigan

Ann Arbor—Robert M. Ilfeld '44  
Birmingham—  
Dearborn—Edwin E. Hebb Jr. '48  
Detroit—Robert A. Lytle Jr. '62  
Grand Rapids—  
Grosse Pointe—  
Kalamazoo—Ezra R. Armstrong Jr. '65  
Lansing—Robert M. Ilfeld '44  
Midland—

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Minneapolis—David F. Juncker '63  
St. Paul—Curtis P. Hedman '66

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Kansas City—Robert D. Hutton '50  
St. Louis—DeVere W. Ryckman CE'56

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Concord—  
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Basking Ridge—  
Caldwell—  
Camden—  
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Cranford—R. N. Summerville '52  
East Orange—

Elizabeth—  
Englewood—Lee Hanower '47  
Fair Lawn—William J. Grant '48  
Jersey City—John White '60  
Montclair—  
Metuchen—Daniel G. Gruber '68  
Morristown—  
Mountain Lakes—Ernest G. De Nigris ME'67  
Murray Hill—Randall H. Kunz '62  
Newark—David L. Wiesen '54  
Nutley—  
Orange—Richard A. Rabinow GM'68  
Plainfield—  
Princeton—  
Red Bank—Joseph P. McCarthy '25  
Ridgewood—Edward G. Remmers '52  
Short Hills—  
Somerville—  
Summit—Donald R. Hamann '61  
Teaneck—  
Trenton—James E. Armington '48  
Westfield—

## New Mexico

Alamogordo—Leonard R. Sugerman '55  
Albuquerque—John R. Freeman '64  
Los Alamos—  
Santa Fe—

## New York

Albany-Troy—  
Babylon-Isliip—  
Binghamton—Jacques E. Linder '55  
Bronx—  
Bronxville—William P. Van Nostrand '42  
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Buffalo—Mario S. DiQuillio '48  
Chappaqua—  
Corning—W. T. Brydges 3rd '62  
Dobbs Ferry—Kirk V. Darragh CM'68  
Flushing—

Forest Hills—  
Freeport—  
Garden City—  
Glen Cove—  
Great Neck—  
Huntington—  
Ithaca—Joseph S. Bravman '66  
Jackson Heights—  
Jamaica—  
Kingston—Robert P. Fried '46  
Larchmont—  
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Mt. Vernon—  
Newburgh—Robert P. Fried '46  
New Rochelle—  
Niagara Falls—Norman Duffett '11  
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Plainview—  
Port Washington—  
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Rochester—Reynold A. Grammer Jr. '47  
Rockland County—  
Roslyn—  
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Greensboro-Winston-Salem—Richard L. Carson '57  
Raleigh-Durham—Jack B. Chaddock ME'49

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Canton—Robert M. Anderson '47  
Cincinnati—Eddy R. Hair '54  
Cleveland—Noel S. Bartlett '60  
Cleveland Heights—J. Robert Mansperger '56  
Columbus—G. Woodford Thomas '39  
Dayton—John P. Kershaw ML'64  
Hamilton-Middletown—  
Lakewood—  
Mansfield—R. Gordon Black '56  
Shaker Heights—Alexander B. Ward '47  
Toledo—Paul H. Rothschild '58  
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Tulsa—

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Portland—William L. Carey '50

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Ambler—  
Berwyn—  
Bethlehem—  
Bryn Mawr—Randolph D. Zelov NC'56  
Erie—Richard Lamborn '24  
Harrisburg—Jack Kinstlinger CE'54  
Havertown—  
Huntingdon Valley—Nelson E. Stefany '61  
Lancaster—  
Meadville—  
Norristown—Irving Safier '51  
Philadelphia—  
Pittsburgh-Central—Herbert A. Chesler EC'64  
Pittsburgh-East—Burton M. Rothleder '53  
Pittsburgh-North—  
Pittsburgh-South—Robert W. Shoemaker GM'64  
Pittsburgh-Tri State—  
Reading—George T. De Moss '52  
Scranton-Wilkes Barre—Howard A. Jacobson '48  
Swarthmore—  
West Chester—  
Wynnewood—Robert E. Wilson '45  
York—Alwin B. Newton ME'32

## Puerto Rico

Puerto Rico—Luis Fernandez Sein '60

## Rhode Island

Barrington—Harold Payson Jr. GY'63  
Cranston—  
Providence—

## Tennessee

Knoxville—George R. Jasny CH'52  
Memphis—

Nashville—William R. Wilcox '42

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Austin—Frank E. Whitson Jr. AR'58  
Baytown—Jack Larks '52  
Beaumont—  
Corpus Christi—Donald B. Wood '35  
Dallas—  
El Paso—  
Fort Worth—Allan W. Shaw '50  
Houston—  
Lubbock—James R. Geddes '25  
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San Antonio—James G. Cronburg '67

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Salt Lake City—

## Vermont

Burlington—

## Virginia

Alexandria—Paul M. Robinson Jr. '44  
Arlington—Milon E. Essoglou '55  
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Newport News—  
Norfolk—Arthur W. Davenport '23  
Richmond—W. Malcolm Watson '34

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Neenah—Daniel J. Hanlon Jr. '37

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Maritimes—  
Montreal—  
Ottawa—  
Toronto—Alan Kotliar '57

## Mexico

Mexico City—Herbert Weinstein NT '66  
Monterrey—Juan F. Llaguno '60

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Netherlands—  
Switzerland—  
United Kingdom—

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India—  
Israel—William L. Abramowitz '35  
Japan—Michael L. Jablow '62

## Oceania

Australia—  
New Zealand—





J. R. Clark, Jr., '50



S. D. Stookey, Ph.D.'40



R. E. Segien, '53



H. R. Moody '41



B. B. Brown, Sc.D.'42



C. F. Schlemmer '59

## Individuals Noteworthy

**William R. Hewlett**, '36, "Business Statesman of the Year" by the Harvard Business School Club of Northern California . . . **David McComb**, '71, to the All-American Collegiate Sailing Team . . . To **Walter J. Tudor**, CE'58, the Toulmin Medal for technical writing by the Society of American Military Engineers . . . To **John Ward Beretta**, '23, the 1970 National Society of Professional Engineers Award.

To **Kay Van Zummeren**, '71, the M.I.T. Alumnae Award . . . To **Jacob P. Den Hartog**, Professor of Mechanical Engineering, Emeritus, the 43rd Lamme Award for excellence in teaching and advancement of engineering education by the A.S.E.E. . . . To **Andrew P. Sage**, S.M.'56, the Frederick Emmons Terman Award recognizing a young electrical engineering educator, also from the A.S.E.E. . . . Recipients of the Atomic Energy Commission citation for especially meritorious contributions to the nuclear energy program: **Hood Worthington**, '24; **William Webster**, Life Member of the Corporation; **Manson Benedict**, '32; **W. P. Overbeck**, '34; **George B. Darling**, '27; **Charles D. Coryell**, Professor of Chemistry; and **M. Stanley Livingston**, Professor of Physics . . . To **Athelstan Spilhaus**, '33, an honorary degree from Hamilton College.

To Mrs. **Anne H. Cahn**, PO'69, and **Jerome E. Milch**, '67, Woodrow Wilson Dissertation Fellowships . . . The George R. Brown Prize for Excellence in Teaching to **Ronald L. Sass**, '49, from Rice University . . . White House Fellows for 1970-1971: **John Nils Hanson**, '64; **Melvyn R. Copen**, '58; **Dana G. Mead**, Ph.D.'66; and **Ronald O. Baukol**, S.M.'60 . . . David T. Schultz Awards to **Donald E. Nelsen**, '62, and **Stephen D. Senturia**, Ph.D.'66, from M.I.T. . . . Departmental awards for excellence in teaching at M.I.T. to **Thomas B. Jones, Jr.**, '66, and **Murray Edelberg**—both Instructors; and to **Richard L. Brenner** and **Irvin S. Englander**—both Teaching Assistants.

To the American Academy of Arts and Sciences: **Sigurdur Helgason**, Professor of Mathematics; **Bernard F. Burke**, '50, Professor of Physics; **Irwin Oppenheim**,

Professor of Chemistry; **Nicholas J. Grant**, Sc.D.'44, Professor of Metallurgy and Director of the Center for Materials Science and Engineering; **Edward A. Mason**, Ph.D.'48, Professor of Nuclear Engineering; and **J. Robert Schrieffer**, '53.

**John R. Clark, Jr.**, '50, to Vice-President—Eastern Region of the Bell Aerospace Division of Textron in Washington, D.C. . . . **Edwin E. Kussmaul**, '25, to Chairman of the Kelek Division of Arrow-Hart, Inc., in Norwood, Mass. . . . **Alfred O. Ginkel**, EC'51, to Area Manager—Asia of the Sybron Corp. . . . **Peter A. Franken**, Ph.D.'56, to Director of the Architectural Technologies Divisions of Bolt Beranek and Newman . . . **James McCormack**, S.M.'37, to the Board of Trustees of the MITRE Corp. . . . **Thomas I. Stephenson**, 3d, '45, to Works Manager of the Aluminum Company of America's Davenport Works . . . **Leo J. Feuer**, '43, to President of the William Carter Company of Needham Heights, Mass., a knitwear manufacturing firm . . . **Robert S. Carlson**, S.M.'49, to President of North American Rockwell Microelectronics Company.

**Allen J. Vander Weyden**, Ph.D.'44, to Director—Advance Systems and Technology Division of McDonnell Douglas Astronautics Company-West . . . **Robert F. Calman**, SL'67, to Governor of the Society of Sloan Fellows and to Chairman of the Financial Research Committee of the American Petroleum Institute . . . **Raymond L. Bisplinghoff**, Dean of the School of Engineering, to Deputy Director of the National Science Foundation.

**Robert H. Sturdy**, '53, to Vice-President—Operations, Analogic Corp., Wakefield, Mass. . . . **Walter J. Humann**, '59, to Vice-President—Secretary and General Counsel for LTV Aerospace Corp. . . . **H. Francis Horton**, S.M.'32, to General Manager—Engineering Department of Texaco Inc. . . . **William Bommer**, '44, to Vice-President and General Manager of the Golf Division, and **Karl P. Goodwin**, '37, to Vice-President and General Manager of the Rubber Division of the Acushnet Company, manufacturer of golf equipment and precision molded rubber products . . . **Robert F. Desel**, Nav.E.'52, to Manager—Marine Systems

cost analysis in the Mobile Oil Corporation's Marine Transportation Department . . . **Robert E. Benedict**, '44, former President and Chief Executive Officer of Phelps Dodge International to President, American Mail Line, Inc., Seattle . . . **Paul W. Allen**, '37, to Senior Vice-President—Mining Group of the Cyprus Mines Corp. . . . **Lloyd Bergeson**, '38, Vice-President and General Manager of General Dynamic's Quincy Shipbuilding Division to the Board of Directors of the Associated Industries of Massachusetts . . . **John H. Cantlin**, '42, to President of the Torngren Company, Somerville, Mass., a division of Standard International Corporation . . . **A. Charles Howell**, MT'42, to Vice-President—Group Actuarial and Underwriting Department of John Hancock Mutual Life Insurance Company.

**W. H. Krome George**, '40, to President of the Aluminum Co. of America . . . **Howard W. Johnson**, President of M.I.T., to a Director of U.S. Plywood-Champion Papers, Inc. . . . **William G. Kay, Jr.**, SL'63, President of Rival Pet Foods to the Board of Directors of Glenmore Distilleries Co. . . . **John C. Stetson**, '43, President of the *Houston Post* newspaper, to President of A. B. Dick Co., to succeed **Karl R. Van Tassel**, '25—Mr. Van Tassel to Vice-Chairman, A. B. Dick Company.

To **S. Donald Stookey**, Ph.D.'40, Director of Fundamental Chemical Research at Corning Glass Works, the Award for Creative Invention of the American Chemical Society and the "Inventor of the Year" award (1969) of George Washington University . . . To **Warren J. Henderson**, '33, the Granite State Award for outstanding public service from the University of New Hampshire . . . **Dean A. Horn**, NC'49, to Executive Officer of the M.I.T. Sea Grant Office.

M.I.T. academic appointments: **Robert E. Hall**, Ph.D.'67, to Associate Professor of Economics . . . **Patrick E. O'Neil**, '63, to Assistant Professor of Electrical Engineering . . . **Julian Beinart**, AR'56, to Visiting Professor of Architecture . . . **Jerome I. Elkind**, '51, to Visiting Professor of Management . . . **Donald H. Steinbrecher**, Ph.D.'63, to Associate Professor of Electrical Engineering . . . **Joseph E. Soussou**, Ph.D.'70, to Assistant Professor



E. Woll, '35



E. J. Corey, '48



M. R. Fenske, Sc.D.'28



K. A. Marshall, '47



F. D. Van Sicklen, '53



D. G. Hoag, '46

of Civil Engineering . . . **Patrick H. Winston**, '65, to Assistant Professor of Electrical Engineering . . . **Abraham E. Nizel**, NT'51, to Visiting Associate Professor of Nutrition and Food Science . . . **Paul Hoff**, '65, to Assistant Professor of Electrical Engineering . . . **Colin G. Whitney**, '66, to Assistant Professor of Electrical Engineering . . . **Stephen M. Carr**, AR'61 Assistant Professor of Urban Studies and Planning . . . **Cecil E. Hall**, Ph.D.'48, Professor of Biology . . . **Richard I. Mateles**, Sc.D.'56, to Associate Professor of Biochemistry Engineering . . . **Charles L. Miller**, '51, to Director of the Charles Stark Draper Laboratory . . . **Richard Schmalensee**, '65, to Assistant Professor of Management . . . **William S. von Arx**, Sc. D.'55, to Professor of Earth and Planetary Sciences.

**John R. McNeil**, AA'55, to Director of Advanced Systems, Electro-Optical Division, Perkin-Elmer Corp. . . . **Alexander M. Williams**, SE'63, and **Milton A. Zimmerman**, S.M.'60, to Vice President, Campbell Soup Company . . . **Jerrold Zacharias**, Professor of Physics, to President, Education Development Center in Newton, Mass. . . . **C. K. Leeper**, ME'48, to Technical Director of Aerojet-General's Nuclear Rocket Division . . . **Richard E. Segien**, '53, to Vice President-Operations of Eastern Urban Services, a new subsidiary of Eastern Gas and Fuel Associates . . . **Lloyd Bergeson**, '38, Vice President and General Manager of General Dynamics' Quincy Shipbuilding Division, to the board of directors of Associated Industries of Massachusetts . . . **Herbert R. Moody**, '41, to Assistant General Manager of Micromedex Systems, Inc., Philadelphia, Pa. . . . **William J. Weisz**, '48, to President of Motorola Inc. . . . **Daniel E. Noble**, EE'38, to Chairman of the Science Advisory Committee of Motorola.

**Donald M. Black**, Ph.D.'47, to Director, Polymer Additives Business Center of the Geigy Chemical Corp. . . . **Peter A. Franken**, Ph.D.'56, to Director Architectural Technologies at Bolt Beranek and Newman, Inc. . . . **A. Raymond Bessette**, S.M.'54, to Senior Investment Analyst by Riter, Pyne, Kendall and Hollister, investment bankers and brokers . . . **James M. Osborne**, S.M.'62, to Division Vice President, Government Communica-

tions Systems of the RCA Communications Systems Division., Camden, N.J. . . . **C. M. Laidley**, SL'65, to Regional General Manager Ontario East and North Region, Canadian Imperial Bank of Commerce . . . **Lawrence E. Godlen**, S.M.'52, to Manager, Atmosphere Explorer Project, RCA Astro-Electronics Division, Princeton, N.J. . . . **Edward Woll**, '35, to Vice President and General Manager, Group Engineering Division, General Electric Aircraft Engine Group . . . **Gerald Katz**, '59, to Corporate Vice President of Witco Chemical Corp. . . . **John H. Litchfield**, '50, to Manager, Biology and Medical Science Section, Columbus Laboratories of the Battelle Memorial Institute.

**Arnold J. Rothstein**, S.M.'51, to Vice President—Programs, Deepsea Ventures, Inc. . . . **Bernard J. Steigerwald**, S.M.'56, to Associate Commissioner, National Air Pollution Control Administration . . . **Herbert H. Richardson**, '58, to Chief Scientist, Department of Transportation . . . **Barremore B. Brown**, Sc.D.'42, to Executive Vice President, Continental Electronics Manufacturing Co. . . . **Walter J. Humann**, '59, to Vice President-Secretary and General Counsel, L.T.V. Aerospace Corp. . . . **William J. Peet, 2nd**, '53, to President, A.G.A. Corp. . . . **Paul O. Gaddis**, S.M.'61, to Vice President—Public Systems and Services, Westinghouse Electric Corp.

**C. F. Schlemmer, Jr.**, '59, to Manager—Development, Film Department, Rohm and Haas Co. . . . **Clare Farr**, '33, to Corporate Historian, MITRE Corp. . . . **Philip Bragar**, '48, to Director—General Services, MITRE Corp. . . . **John C. Proctor**, '38, to Division Administrator, Strategic and Range Systems Division, MITRE Corp. . . . **F. Douglas Van Sicklen**, '53, to President and Member of Board of Directors, XYZ Corp. . . . **Robert C. Kley, Jr.**, '58, to Design Support and Standards Manager, R.C.A. Aerospace Systems Division.

**Jules J. C. Picot**, S.M.'57, to Chairman, Chemical Engineering Department, University of New Brunswick . . . **Guy T. McBride, Jr.**, Sc.D.'48, to President, Colorado School of Mines . . . **Raymond D. Gumb**, '60, to Assistant Professor of Philosophy, Lafayette College . . .

**Arthur B. Engel**, S.M.'45, to Superintendent of the Merchant Marine Academy . . . **Merrell R. Fenske**, Sc.D.'28, to Professor Emeritus of Chemical Engineering, Pennsylvania State University . . . **Forbes T. Brown**, '56, to Professor, Department of Mechanical Engineering and Mechanics, Lehigh University . . . **Albert L. Zobrist**, '64, to Assistant Professor of Computer Science, U.C.L.A.'s School of Engineering . . . **Douglas W. Woods**, Ph.D.'70, to Professor, Department of Economics, Government and Business, Worcester Polytechnic Institute . . . **Ralph M. Guerke**, '34, to Instructor, Science Department, Montclair Academy, Montclair, N.J. . . . **Walter L. Hill**, '50, to Vice Rector, St. Paul's School, Concord, N.H. . . . **Bruce B. Bates**, S.M.'54, and **Robert W. Miller**, S.M.'52, to Board of Trustees, Rochester Institute of Technology.

**James R. Killian, Jr.**, '26, to five-member Public Policy Committee, General Motors Corp. . . . **Frank Press**, M.I.T. Professor of Geophysics and Chairman, Department of Geology and Geophysics, appointed by President Nixon as member of the National Science Board, the policy-making body of the National Science Foundation.

**Ernest R. Bilmont**, Ph.D.'56, to President, New Jersey Chapter, American Institute of Chemists . . . **Nathan E. Promisel**, '29, to Vice President-Elect, American Society for Metals . . . **W. Edwin Jarman**, '61, to Chairman, Canadian Cable Television Association . . . **Walter J. Monasch**, M.C.P.'53, re-elected to President of the American Institute of Planners . . . **Kenneth A. Marshall**, '47, to President-Elect of the Health Industries Association . . . New appointments of the American Management Association: **Don G. Mitchell**, '38, to Chairman of the Executive Committee and Chief Executive Officer; **Robert Stuart**, S.E.'59, to member of Board of Directors; **John L. Jones**, S.M.'54, to Vice President—Management Systems & Sciences; **Paul Hotte**, '42, to Vice President—Research & Development.

**Fred O. Urban**, '29, to Fellow, American Society of Mechanical Engineers . . . **Richard H. Battin**, '45; **John Russell Clark**, '29; **James A. Fay**, S.M.'47;



**Joseph G. Gavin, Jr.**, '41 **Walter R. Ramsaur**, '28; **H. W. Withington**, '39 all to Fellows of the American Institute of Aeronautics and Astronautics . . . **Willard K. Davis**, '40, to member, National Academy of Engineering.

To **Henry Melson Stommel**, M.I.T. Professor of Oceanography, an honorary Doctor of Science degree from Yale University . . . To **Arthur T. Ippen**, M.I.T. Professor of Civil Engineering, a Caltech

**John F. Taplin**, '35, to vice-chairman for the 1970-1971 Massachusetts Bay United Fund campaign by **Philip H. Peters**, '37, the United Fund's West Division Chairman . . . To **F. C. Jelen**, '31, the Award of Merit for 1970 from the American Association of Cost Engineers . . . **Robert D. Peck**, '44, to executive vice-president of the American Association for Contamination Control . . . **Walter J. Hamburger**, '21, to Honorary Membership in The Fiber Society, Inc. Only four such awards have ever been conferred. **Frank Horan**, '57, to director of operations at the Quincy Ship-Building Division of General Dynamics . . . **William S. Edgerly**, '49, to the Board of Directors of the Cabot Corporation . . . **Justin M. Margolskee**, '44, to general manager of Raytheon Company's Missile Systems Division . . . **J. C. Williams**, '38, a General Manager, Refining Department—United States, of Texaco, Inc.

**Alfred B. Booth**, '41, to corporate vice-president—management services, Warnaco, Inc. . . . **C. A. Christy**, '65, to president of PHI Computer Services, Inc., a wholly owned subsidiary of Wang Laboratories, Inc. . . . **David J. Barber**, '65, to treasurer and director of software development, and **W. Harry Vickers**, '65, to vice-president, engineering of ENTREX, Inc. . . . **Alan J. Dworsky**, '57, to vice-president of the Putnam Management Co., Inc., Boston . . . **Joseph F. Alibrandi**, '52, to executive vice president, Whittaker Corporation . . . **Karl P. Goodwin**, '37, to executive vice-president by **Richard B. Young**, '38, President of Acushnet Company . . . **Harold Wells**, '55, to General sales manager for the Microwave Products Group of Microwave Associates, Concord, Mass. . . . **Roger L. Griffin, Jr.**, '54, to general manager of Marine Hydraulic Systems, Inc., Salem,

Mass.

Alumni Distinguished Service Award . . . To **Jay W. Forrester**, '45, M.I.T. Professor of Management, the 1969 Publications Award of the Organization Development Council, for his book *Urban Dynamics* . . . **Paul W. Barcus**, '48, Associate Professor of Nuclear Engineering, Iowa State University, to appear in the 1970 edition of *Outstanding Educators of America*. Earlier this year he was honored by the University with an Outstanding Teacher Award.

Awards of the Optical Society of America: to **George R. Harrison**, Dean Emeritus of Science, M.I.T., the William F. Meggers Award; to **Robert E. Hopkins**, '37, Professor of Optics, University of Rochester, the Frederic Ives Medal . . . To **Leonard Nanis**, '52, the 1970 Richard L. Templin Award of the American Society for Testing and Materials . . . To **David G. Hoag**, '46, the Col. Thomas L. Thurlow Navigation Award for outstanding contribution to navigation . . . To **Elias J. Corey**, '48, the American Chemical Society's \$1,000 Award for Creative Work in Synthetic Organic Chemistry sponsored by the Synthetic Organic Chemical Manufacturers Association.

To **Andrew J. Slobodnik, Jr.**, '65, the U.S.A.F. Research and Development Award . . . To **Frederick H. Cleveland**, S.M.'68, the Air Force Commendation Medal . . . To **Gilbert G. Lorenz**, '34, Technical Director of the U.S. Army Engineer Topographic Laboratories, the Exceptional Civilian Service Medal awarded by the Army.

To **Calvin S. Koonce**, '60, a Distinguished Young Scientist certificate of the Maryland Academy of Sciences . . . To **James F. Durig**, Ph.D.'62, the 1970 Coblentz Society Memorial Prize for work in molecular spectroscopy . . . To **Ernest S. Gladney**, '70, first prize in the first annual national competition for original undergraduate research in nuclear chemistry sponsored by the Division of Nuclear Chemistry and Technology of the American Chemical Society . . . **Donald W. Douglas**, '14, founder of Douglas Aircraft Co., and honorary chairman of McDonnell Douglas Corp., to membership in the Aviation Hall of

Fame . . . For **Edwin Aldrin, Jr.**, Sc.D.'63, a small crater on the front face of the moon to be named in his honor.

## A Birthday and a Salute

The upcoming 23rd annual Fiesta of the M.I.T. Club of Mexico City, which is celebrating its 60th birthday this year, is set for Thursday through Saturday, March 11 to 13, 1971, the club has announced. The three-day program—planned as a testimonial to Dr. and Mrs. Killian—is an opportunity for all alumni south of the border to salute Dr. Killian, '26, prior to his retirement as Chairman of the M.I.T. Corporation.

Several club members are offering free room and board to young couples—graduated 10 years or less—in an effort to attract younger alumni who might otherwise hesitate to treat themselves to a Mexican holiday. These invitations are limited in number and are available on a first-come-first-served basis. For further details write the club at Reforma 116-804, Mexico 6, D.F., Mexico.

## Alumni Calendar

**Boston**—December 10, Thursday, 12:15 p.m.—Luncheon meeting, Aquarium Restaurant. Speaker: E. Carey Brown, Chairman, Department of Economics, M.I.T. Topic: Economic Trends of 1971.

—January 14, 1971, Thursday, 12:15 p.m.—Luncheon meeting, Aquarium Restaurant. Speaker: James P. Loughlin, Secretary and Treasurer of Mass. State Labor Council A.F. of L./C.I.O. Topic: Labor Goals for the '70s.

**New York**—December 5, Saturday—Statler Hilton Hotel, all day seminar on E.D.P.

—December 8, Tuesday, 12 noon—Luncheon, Brass Rail Restaurant, 521 Fifth Ave. Speaker: Roy R. Newberger. Topic: Modern Art—Hoax or Genius.

**Northern New Jersey**—January 11, 1971—Speaker: John Bartels, Attorney in charge of New Jersey's Strike Force Against Organized Crime. Topic: Organized Crime and Business.



George C. Dandrow, 1952 victim . . .



. . . G. Peter Grant, 1970 penitent

## M.I.T. Club Notes Picnic Quip—Fiesta SpooF

Inventiveness saved the day at the annual summer picnic and business meeting of the M.I.T. Club of Dallas. "Next time we have lobsters and clams airmailed from Maine," reports John M. Davis, '67, Secretary of the Club, "I think we'll try to boil the lobsters instead of steaming them." It seems the problem was solved with some very practical engineering to get the fire hot enough to start the steaming process. "George Filak, '54, reversed the flow from his vacuum cleaner to blow, and the club members took turns directing the flow over the coals," he said.

The proverbial bread cast upon the waters returned to G. Peter Grant, '35, Director of Clubs, at the 22nd Mexican Fiesta last March. Thanks to Clarence "Nish" Cornish, '24, the Director of Clubs received a comeupance 18 years in the waiting for his photographic spoof of C. George Dandrow, '22, at the 4th annual Fiesta back in 1952. Mr. Dandrow, past president of the New York M.I.T. Club and of the Alumni Association, and hammer thrower on the 1920 U.S. Olympic team, is shown (see photo)—the result of darkroom skulduggery for which Mr. Grant is responsible—overwhelming his South American mount. When "Pete" Grant arrived at last year's fiesta, retribution was swiftly meted out and captured on film for "Nish" Cornish remembered the 1952 event. Plans for this year's fiesta are reported below.

## Deceased

William F. Keene, '91, December 19, 1967  
Horace W. Oxnard, '00, March 11, 1970  
Percy R. Ziegler, '00, August 31, 1970  
Arthur R. Nichols, '02, January 23, 1970\*  
James S. Sheafe, '03, August 5, 1970  
A. Senior Prince, '05, September 4, 1970  
Herbert Callman, '06, May 9, 1970  
Henry S. Hubbell, '06, August 8, 1970  
Herbert C. Elton, '08, September 16, 1970  
Samuel N. McCain, '09, April 1, 1970  
Earl Pilling, '10, August 19, 1970\*  
Harvey P. Wasserboehr, '10, August 20, 1970  
Rudolph H. Fox, '12, August 7, 1970\*  
Alexander J. Pastene, '13, August 29, 1970

Homer Calver, '14, September 15, 1970\*  
Leland V. Clark, '15, August 18, 1970  
Donald A. Fowle, '15, August 6, 1970  
Dana Barker, '16, August 29, 1970\*  
Harry E. Whittemore, '16, April 22, 1970  
Ernest A. Grunsfeld, Jr., '18, August 13, 1970  
Charles W. Lippitt, '18, June 22, 1970  
Theodore P. Wright, '18, August 21, 1970  
Walter T. Hall, '19, July 29, 1970  
Merle H. Davis, '21, November 30, 1967\*  
Laighton Evans, '21, July 22, 1970  
Jackson W. Kendall, '21, July 23, 1970\*  
John J. MacNeil, '21, June 8, 1968\*  
Myer Alpert, '22, September 13, 1970\*  
Donald D. Stowe, '22, April 28, 1970  
Clarence M. Bouis, '26, August 14, 1967  
Walter E. Ditmars, '23, January 31, 1962  
Stuart P. MacDonald, '23, August 15, 1970\*  
Winthrop G. Dow, '23, July 21, 1970  
Hugh S. Ferguson, '23, September 2, 1970\*  
Lawrence T. Haugen, '23, July 25, 1970  
Richard C. Eaton, '24, December 13, 1969  
Morris A. Rabkin, '24, June 6, 1970  
Leslie C. Currier, '26, January 3, 1970  
Chalfant Head, '26, June 21, 1970  
Edward G. A. Powers, '26, July 29, 1970  
Frederic E. Glantzberg, '27, July 1, 1970\*  
George E. Francis, Jr., '28, August 5, 1970\*  
Frank W. Horn, '28, August 25, 1970\*  
Lloyd Dolge, '29, October 20, 1969  
Sidney L. Kaye, '30, September 8, 1970  
John Senter, '30, December 25, 1968\*  
William Volante, '31, January 17, 1968  
Rudolph Tietig, Jr., '32, July 10, 1970\*  
Leonard R. Bradford, '33, September 27, 1970  
Joseph N. Kotanchik, '38, August 22, 1970  
Kent F. Bradbury, '39, July 27, 1970  
E. Eleanore De Mailly, '40, May 31, 1969  
Edward W. Forth, '47, September 29, 1967  
Irving B. Rau, '49, March 25, 1961  
Edward R. Kinsley, '59, December 19, 1968  
Panayotis Mallios, '59, December 25, 1969  
Howard S. Turkington, '65, June 29, 1970  
Harper B. Keeler, '66, January 30, 1970  
John Fishback, '68, February 25, 1970\*



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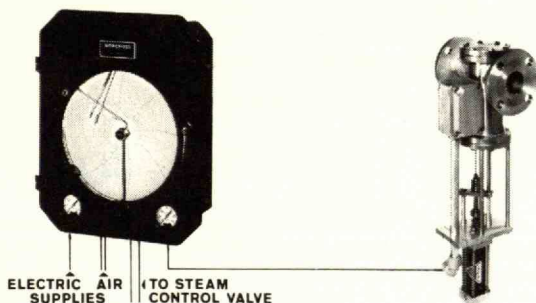
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## In the United States:

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Using Management Science Effectively in Large Organizations

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Computer-ology for Management Session I

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May 10-13, 1971 Harvard Business School

Planning in the Changing Environment I

February 21-24, 1971 Sea Island, Georgia

New Product Marketing and Corporate Strategy

March 14-17, 1971 Rancho Santa Fe, California

Planning, Programming, Budgeting, and Evaluation Systems-Improved Management of the Public Sector

March 14-17, 1971 Williamsburg, Virginia

Planning in the Changing Environment II

April 18-21, 1971 Oakbrook, Illinois

Motivation, Reward, and Measurement of Managers-Management Control Systems

April 18-21, 1971 Dallas, Texas

Behavioral Science Concepts for Managers-Organization Design and Development

June 6-9, 1971 Harvard Business School

The Changing World of Financial Reporting

June 6-9, 1971 Harvard Business School

Changing Patterns in Corporate Mobility-Acquisitions, Mergers, and Divestitures

June 6-9, 1971 Harvard Business School

## In Europe:

Computer-ology for Management

January 13-16, 1971 Geneva

Changing Patterns in Corporate Mobility-Acquisitions, Mergers, and Divestitures

April 21-24, 1971 Rome

Planning in the Changing Environment

May 5-8, 1971 London

Motivation, Reward and Measurement of Managers-Management Control Systems

June 16-19, 1971 London

The Changing Role of the Manager 1970-1980

June 20-23, 1971 The Hague

Multinational Marketing Management-Strategy and Structure

June 30-July 3, 1971 Berlin



# Class Review

## 95

How good to see 1891 represented in the *Review*! My congratulations to Harrison I. Cole on his 100th birthday.

A telephone call to the nursing home lets us know that **Luther Conant** is fine.

Christmas Greetings and a good New Year to all.—**Andrew D. Fuller**, Secretary, 1284 Beacon St., Brookline, Mass. 02146

## 96

Late in the summer your acting secretary was in Schenectady and had a very pleasant visit with Dr. **Will Coolidge**. He had been looking over his own biography, *Coolidge, Yankee Scientist*, and said it made him realize how influential "luck" was in determining the path one's life takes. He gave as an example his association with Dr. Whitney in the chemistry department of M.I.T. which led to his going to G.E. when Whitney became the first director of the research laboratory. Dr. Whitney was the first scientist to show that pure research was profitable for industry and Dr. Coolidge's work with tungsten is one of the classic examples of this. He also described his student days at Leipzig and the good fortune he had in being assigned the task of showing the laboratory to Roentgen when the discoverer of X-rays was considering the directorship of the Leipzig laboratory. Dr. Coolidge had been chosen as the guide because his German was fluent and this was because he had been lucky in finding lodgings with a family in which four young children had helped him learn to speak the new language. I, too, was lucky to find him at home and not busy. The day before, 19-year-old William D. Coolidge, 2nd, had been visiting his grandfather and the next day Dr. Coolidge's son was expected.

Now a little news about myself. As you see there is a new address for future communications. This is because I have returned to Washington, D.C., to teach in the public schools where I began my career some 30 years ago. I had intended to stay in Plymouth but an administrative "snafu" put two teachers in one position.

I was transferred to math and it seemed to be permanent. It seemed foolish to start all over in a new field after trying hard to keep up with the changes in physics teaching over the years—so here I am in a very different situation.

May all of you enjoy the holidays with your families and friends.—**Clare Driscoll**, Acting Secretary, 800 4th St. S.W., Apt S304, Washington, D.C. 20002

## 98

Very best wishes for good health and happiness during the holidays and the coming year. There are now six classmates of '98 and in a later issue your names and addresses will be listed.

**Bob Lacy** wrote from Squirrel Island, Maine during the summer that "there are only five left of my 1896 Johns Hopkins class. The important things in my recent life were two operations in March and April, gall bladder and stone in duct removed. They are now healed, leaving a scar with stitches which look like a seven-inch caterpillar. There are only three grandchildren, but good ones. When you tour south I will be glad to see you in Baltimore."

The Alumni Association informed me of a letter it received from Miss Elizabeth F. Lambert telling about the death of her mother, **Mabel Forrest Lambert** on February 6, 1970 in Lowell, Mass. She would have had her 95th birthday this December. The sympathy of the Class goes to you, Miss Lambert, and to your sisters and brothers. May the thought of your mother's life, so full of service and accomplishment, be a source of comfort as it surely must be a source of pride. The success story of her life and that of her husband, Dr. John H. Lambert, is written up in the *Technology Review* of July-August 1968.

As I wrote the above, I thought how true it is that every single member of the Class of '98 has had a rewarding life "full of service and accomplishment."

—**Mrs. Audrey Jones Jones**, Acting Secretary, 232 Fountain Street, Springfield, Mass. 01108

## 00

Corresponding with Mrs. Margaret Barrett of the Department of Chemical Engineering on the occasion of the department's 50th anniversary **Charles E. Smith** reports: "So you are to have a 50th anniversary. Let me take you with me to a 75th. I entered M.I.T. in September 1895 with the Class of '99 but due to health and financial reasons dropped out after the third year and returned to graduate with '00.

"In September 1895, we were invited to Rogers Auditorium to hear a lecture by Dr. Francis Amasa Walker—one of M.I.T.'s great presidents—to hear him lecture on 'Choice of a Profession.' Among other things he said: 'If you have a devoted longing and aptitude for a particular profession learn all you can about it and stick with it. If not and you belong to a family which has a successfully established business, learn all about it and participate in it. If you are not included in either of those categories I recommend that you study chemical engineering or electrical engineering which will grow rapidly during your lifetime and offer continual employment with exceptional opportunities for advancement.' How right he was."

So Mr. Smith undertook the study of chemical engineering. But as his freshman year progressed, he began to have second thoughts. "Came the spring of 1896. What's so rare as a day in June? What's so raw as a day in June in a smelly chemical lab when the students in civil engineering are peeking through their transits and levels and waving their brilliantly painted red and white rods in the sunshine on the beautiful green grass under our windows? Goodbye, embryo chemical engineer—Hello, mediocre civil engineer.

"And that is just why and only why I forfeited a chance to become one of the world's great chemical engineers and led a very interesting life as an all around civil engineer. Yours for another seventy-five years. C. E. Smith."—The Editors, *Technology Review*, Room E19-430, M.I.T. Cambridge, Mass. 02139

# 02

From the Alumni Office it is learned that **Arthur R. Nichols** died on January 23, 1970. Nichols practiced architecture and landscaping in Minneapolis and St. Paul for many years and participated in the architectural development of those cities. He was for a long time a member of Morill & Nichols, Inc. Later he established himself as a consultant in landscaping, and served the University of Minnesota in that capacity for 42 years.

About 1962 he retired from active practice and took up residence in Rochester, Minn., the home of the Mayo Clinic; both his son and son-in-law are associated with the clinic. He leaves his son, Dr. Donald Nichols, his daughter, Mrs. Howard A. Anderson, nine grandchildren and one great grandchild, all of Rochester.—**Burton G. Philbrick**, Secretary, 68 Dane St., Beverly, Mass. 01915

# 03

A long delayed and much needed obituary notice for our class news pertaining to our active classmate, **Walter P. Regestein**, Course V, has just arrived. It states that Walter was preeminent in the development of the new form of smokeless powder so much in evidence in World Wars I and II. After graduation from M.I.T. in 1903, Walter became employed at the Hygienic Chemical Co. of Elizabeth, N.J., with whom he remained until 1912 when he joined the du Pont de Nemours company of Wilmington, Del., as chief chemist and ballistic engineer in Penns Grove, N.J. In 1918 he became chief chemist at du Pont's Haskell, N.J. plant, which was heavily engaged in producing powder for the U.S. in World War I.

Walter next became chief chemist at du Pont's Carney Point, N.J. plant, from 1920 to 1925. His final transfer was to the Research Department of the company at Wilmington, where he remained until retirement in 1947. He acquired numerous patents relating to power and its chemical ingredients which brought him renown among ordinance specialists both in this country and abroad.

Walter is survived by his wife, Mae Keough; three daughters, and six grandchildren.—**John J. A. Nolan**, Secretary-Treasurer, 13 Linden Ave., Somerville, Mass. 02143

# 04

I hope it is not too late to mention the fact that Mr. and Mrs. **Maynard Holcombe** were present on Alumni Day. They attended all the festivities, met many of their old friends and really enjoyed themselves. I received a letter from Maynard later and I would like to quote part of it.

"Martha and I have been renewing old acquaintances around Cambridge and

attending M.I.T. alumni festivities and have called you several times but missed you somehow as well as Mary Hayward, whom we discovered has been in the hospital but is doing all right. I hope you have not succumbed to anything of the sort. We attended the Pops concert Sunday night and sat with the M.I.T. contingent but no 1904 mates showed up on the floor and the busses from Cambridge were so jammed we couldn't tell classmates from gate crashers—but we had a good time with some of the youngsters attending their reunions who were very much in evidence. There is not much to report about our classmates in Florida.

"**Johnnie Marston's** wife died last December and his failing eyesight has forced him to sell his house in St. Petersburg and move to Tampa. **Myron Dole** and his wife are enjoying life in Kissimmee, not far from the new Disneyland now assuming shape to rival its progenitor in California, and which is already causing new roads and accommodations for tourists to grow for 40 miles around it in central Florida, as you have probably learned from promoters of real estate developments in the state where it is claimed you can live long and happily on a retirement income.

"My son Marshall, '36, has recently retired and built a spacious house at Naples, 150 miles south of St. Petersburg on the Gulf, where he has a boat and where I now keep my water skis—you are welcome to try them any time you visit me. Think it over while you are still ambulatory."

I received two notices from the Alumni Office recently noting the death of classmate **Walter D. Estes**, June 16, 1970 and a change of address for **Frank Milliken** to 23 Fortune Rd., Yarmouth Port, Mass. 02675. Mrs. Carle Hayward notified me she was moving to 878 Worcester St., Wellesley, Mass., as of October 14.

Best wishes for a pleasant holiday season to you all.—**Eugene H. Russell**, 82 Stevens Rd., Needham, Mass. 02192

# 05

Thanks to those whose contributions to the November issue helped make it a bit more newsy than usual; and to those whose modesty prevented contributing—help for the next issue! And to all '05 men everywhere, a hearty wish for a healthy and happy Christmas.

In answer to a card (wishing **Sam Seaver** a healthy and happy birthday—his 89th), I received a "thank-you" stating that it was both healthy and happy; that he had a birthday surprise party with all but one of his 13 grandchildren present—the one in Renfrew will be here on October 12, Canadian Thanksgiving." Sam was in the hospital for six weeks last spring but has recovered to the extent that his doctor will allow him to visit Florida in February. Sam's address is P.O. Box 91, Markham, Ontario.

**George Rhodes**, Course VI, in telling me that he has moved up the street from 225 to 229 Forest Ave., Glen Ridge, N.J., states that he is in good shape—considering—but that old age is catching up to him! Hope you are still playing golf, George.

**Prince Crowell**, Course X, reports having been hospitalized with a heart problem, but apparently has recovered in good shape. I know he would like to hear from his classmates at Bar Neck Rd., Woods Hole, Mass.—**Fred W. Goldthwait**, Secretary-Treasurer, Box 32, Center Sandwich, N.H. 03227; **William G. Ball**, Assistant Secretary, Bradenton, Fla. 33505

# 06

How easy and pleasant would be the duties of a class secretary if a lot more classmates were like **Jim Wick, Jr.** After learning of the death of his wife Clare we had sent Jim and family a letter of sympathy from the Class and soon received a long, interesting letter in reply. We were glad to learn that her last year was a pleasant one. "She seemed to come alive, became interested in everyone and even wrote letters . . . a wonderful partner for 68 years." Jim says he uses a cane, "staggers" about, and is as busy as ever; he enjoys life, his many interests and his family. Among those interests is the Arms Museum on Wick Ave., in Youngstown, and he had done considerable research—with his daughter Harriet Wick Schaff—on the builders of the Mahoning Valley. Jim sent us Volume II of the Historical Collections of the Mahoning Valley, much of it about the John Young, born in Peterboro, N.H., in 1763, who owned much of the land and lived on parts of what became Youngstown. It must have required considerable research as indicated by the lengthy bibliography and long list of acknowledgements. A very interesting story—congratulations and thanks Jim.

We have recently had much closer contact with a member of the Wick family, Jim's son Warner and his wife Peggy, of Rockport, Mass. We spent a week there in mid-September and called on them in Emily Wick's house overlooking the harbor and the ocean beyond the breakwater. Unfortunately Emily, an M.I.T. professor, was unable to be with us but we greatly enjoyed our Social Hour with Warner and Peggy. That stay at Seaward Inn wasn't very pleasant weatherwise (four rainy days out of eight).

Through the Alumni Office we heard from **Harry Fletcher** a while ago. He said he had acquired a Pace Maker and hoped to keep pace "with you all and attend the reunion in 1971, our 65th, with my old Portland classmate, General Fogg." . . . Also through the Alumni Office we learned late in July that **Jim Orme** had been in the hospital in Palm Beach for six months. The report came from V. Y. Orme and we have sent a card to Jim's New York City address.



We have one death to report. **Elmer Dwight McCain** died July 1, 1970, probably in Frederick, Md. He was born August 26, 1882, in Alleghany, Pa.; he prepared at the high school there, obtained his A.B. at Washington and Jefferson College, joined our Class junior year and received his degree in civil engineering. His thesis was "Design for a Reinforced Concrete Bridge over a Railroad." Dwight was in engineering work in Pittsburgh until 1914 when, mainly for reasons of health, he started the McCain Orchard Co., in Frederick. He had held office in many civic organizations and pursued an unusual hobby—raising pure bred hunting dogs for hunting and the show ring. In 1915 he married Alice White Dean; they had no children. Assuming that his wife survives we have sent a note of sympathy from the Class.

That's all for now. Marion and I wish you and yours a most enjoyable Christmas and a Happy New Year.—**Edward B. Rowe**, Secretary, Treasurer, 11 Cushing Rd., Wellesley Hills, Mass. 02181

## 08

We have a report from **Harry P. Sweeney**, retired at 37 Camden Street, Rockland, Maine, who gives a brief outline of his experience in mining in many states and many lands. After graduation in 1908 as a mining engineer, he spent two months in Puerto Rico investigating a reported coal find. The next year he was "Chief of Party" planning state highways for Pike County, Pa. In 1909-10, he was engaged in engineering and bookkeeping for Maryland Coal Co. of St. Michaels, Pa. From 1910 to 1913 he served as general superintendent for seven coal mines in Arkansas and Oklahoma, acting in 1913-14 as superintendent of Richard Iron Mine in Wharton, N.J.

The year 1914-15 was spent prospecting for coal at Port Hawkesbury, Nova Scotia. From 1914 to 1920 he was superintendent of the Fort Montgomery Iron Corp. in Fort Montgomery, N.Y. During this period he served twice as coal consultant for the N.C. & St. L. Railroad. (Nashville, Tenn.) From 1920 to 1921 he served as exploratory engineer for Midvale Steel and Ordnance Co., Edison, N.J., and from 1920 to 1923 he was general manager for Ramapo Ore Co., Sterlington, N.Y. During the years 1924-27, he served as general manager and director of Citizens Gas Co., Stroudsburg, Pa. and from 1927 to 1932 his responsibilities were those of general manager for the Rhodesian-Vanadium Corp. in Salisbury, Southern Rhodesia, a company engaged in buying and mining chromite.

The year 1933-34 found him in Jalapa, Guatemala as special engineer for the Vanadium Corp. of America. Then in 1934 his career brought him to Washington, D.C. where he served as a technical advisor to various Federal agencies regulating the coal, lead, copper and zinc mining operations. This brought him to

1947 and retirement, which he is still enjoying. He ends his report with a final quip, "A rolling stone, but oh, what memories."—**Joseph W. Wattles**, Secretary, 26 Bullard Rd., Weston, Mass. 02193

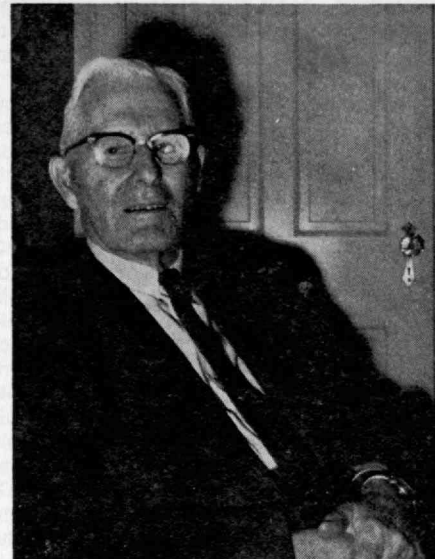
## 10

I received a note from Mrs. **Earl Pilling** enclosing an article from the *Dedham Transcript* of August 20, 1970 regarding the death of her husband. She said the article omitted that Earl was Secretary of the Planning Board for about 20 years. "Earl W. Pilling, engineer, historian, banker, former Town Meeting Member and World War I veteran died Wednesday, August 19th, at the Maple Grove Manor Nursing Home in Norwood at the age of 82. Mr. Pilling resided for 48 years at 36 Willow Street in Dedham, and was the founder and owner of the Dedham Pilling Engineering Co. from 1910 to 1953 when he retired. He was a former vice president of the Dedham Cooperative Bank, former president of Dedham Historical Society, and member of the Society in Dedham for Apprehending Horse Thieves. He was a director of the bank from 1938 to 1969 when he was elected an honorary director; and vice president from 1953 to 1969. Mr. Pilling was a graduate of Massachusetts Institute of Technology, Class of 1910. He was a veteran of World War I and later a member of the American Legion, Dedham Post #18, and the Jacob Jones Post, Veterans of Foreign Wars. Mr. Pilling knew Dedham and its environs better than perhaps any other person. As an engineer he mapped every brook and underground spring and culvert in the town; and as the unofficial town engineer for nearly half a century, surveyed or mapped every parcel of land in the town. Virtually every deed and lot transfer over that long span carries the imprint of the Pilling Engineering Co."

The following is from the *Asbury Park* (N.J.) *Evening Press* of April 8, 1970.

"**Edward O. Scriven**, 86, of 414 5th Ave., died yesterday at Jersey Shore Medical Center, Neptune, after a long illness. He was born in Beloit, Wis., and lived here 28 years. He was formerly of Long Island, N.Y. He was a retired engineer with Bell Labs, New York. He served as technical adviser to the Army Signal Corps at Camp Evans, Wall Township, during World War II. Mr. Scriven was a member of the National Society of Motion Picture Engineers."

I also received the following article on **William J. O'Hearn**. "Mr. William J. O'Hearn, 82, of 21 Fifth Ave., Scituate, retired superintendent of Holyhood Cemetery Association, Brookline, and a 1910 graduate of M.I.T., died Wednesday in South Shore Hospital after a short illness. Upon graduation from M.I.T. Mr. O'Hearn entered his father's business, the M. J. O'Hearn Construction Co. of Brookline. In 1921 he joined Holyhood Cemetery Association and served as treasurer until 1948 when he was ap-



"His picture Obie sends along With greetings both sincere and strong That Christmas may bring health and joy To ev'ry classmate, ev'ry boy."

pointed superintendent. He retired in 1960. He was a member of the American, New England and Massachusetts Cemetery Associations."

I received a notice from M.I.T. on the passing away of **Phillip T. Harris** of Chamblee, Ga. on August 9, 1970.

I received a plaque congratulating me on my 40 years as secretary of the class. I do not know who was responsible for sending me this as it came in an envelope with no name or address. However, I sincerely wish to thank the class members in general for this fine token of appreciation. I have enjoyed acting as your secretary these many years.—**Herbert S. Cleverdon**, Secretary, 112 Shawmut Ave., Boston, Mass.

## 11

The February issue of *Commerce Digest* contained the following statement by President Howard W. Johnson regarding the \$100,000 Alcoa Foundation gift in the name of **Irving W. Wilson**: "The fund is a most fitting tribute to 'Chief' Wilson's brilliant leadership of the aluminum industry and his outstanding record of public service. For years his name has been synonymous with Pittsburgh for legions of M.I.T. faculty, students and staff. The Institute has benefited tremendously from his presence and active participation in the governance of M.I.T." The fund accrues to the Alfred P. Sloan School of Management for use in support of teaching and research.

Through the Alumni Office I learned of the death last April of **Laurence G. Odell**. He was a native of Boston and went to Mechanic Arts High School. Laurence graduated in Course XIV, electro-chemistry, and lived in New York for many years.

Let's get started thinking again about our 60th reunion next June and how nice it would be to see some of the boys once again. If you haven't sent back the reply card you received last October, dig it out and send it along. If you have any suggestions for the committee, we need them.

Nobody has written to Obie lately so these notes are short. Let's hear from you.—**Oberlin S. Clark**, Secretary, 50 Leonard Rd., North Weymouth, Mass. 02191

## 12

DO YOU REMEMBER our lectures in physics which were held on the second floor of the Walker Building, and reached by a long flight of stairs. "The lectures started promptly at five minutes after the hour. If you had not reached the top of the stairs when the clock struck the five minute mark, you were out of luck. The door would be locked. In Boston recently, I passed the site of Rogers and Walker Buildings, and though the landscape had been greatly changed, many memories, such as this one, came to mind." (Contributed by **George Chambers**. Please send me yours.)

**Alvin Thompson**, Course II, continues to live at Friendship Manor, a convalescent home at 320 Harshberger Rd., Roanoke, Va., where he has now been staying for over three years. Receiving no reply to letters, I wrote Mr. Rice, Administrator, who advises that Al is able to get about with some help and still does some reading. "He seems happy and well content, and is a very fine patient. I do not know why you have not heard from him." Some classmates may wish to write. . . . **Billy Reeves** writes from Palmerton, Pa., that both he and Bea are thankful still to be in good health, and that he is active in various projects about his home. His son, Tom, and wife visited from Minnesota last June to attend the graduation of a grandson, Glenn, from Blair Academy, N.J., Billy's own alma mater. Glenn will enter the University of Minnesota this fall. Billy took a job last spring with the Census Bureau, and had an interesting and friendly experience making contacts with some 200 residents.

We have an active golfer in **George Sprowls** of Akron, Ohio, who plays weekly for a round of 18 holes at the country club with a group of retirees. George attended his 60th reunion this year with his class at Washington and Jefferson College. He writes, "I hope we shall have a reunion at Tech in 1972. I know that I would like to meet all of my old 1912 classmates and assume that the other men will feel the same as I."

Here is another of the interesting philosophical commentaries we always welcome from **Bill Rhodes**, author and humanist. "I am now eighty! To you all I recommend *Heaven Has No Favorites* by Erich M. Remarque, who also wrote, *All Quiet on the Western Front*. So, we are

to see all the new 'things'; listen to all the new music and new sounds; keep moving about; experience everything possible; and so live to the limit of all those earth-bound senses which may be still available. There is a freedom peculiar to us octogenarians. We have done what we could. My book, *Humanology*, rests in many libraries, awaiting discovery. There is no time or energy left for motion. My stocks are low, but I'll let 'em alone; they will either come back or they won't. My dependents have learned that I will not make a million, and are relying on themselves—successfully so. As for results, the most striking one to me was surprising; it was the sudden appreciation of color. It startles me to see all the blues, greens, reds, whites, pinks, the color blindness of the night. Also, having smoked too many cigarettes for 70 years and now being dead, according to statistics, my desire for them has abated. Having lived a long time, I know that a prediction of any kind is never possible, and that 'non-profit' is never an asset, but a liability in one way or another."

**Paul Tyler** and Katherine are still keeping active in Florida where they have now lived for about two years. Paul writes, "Several of my older friends have had some wry feelings of possible participation in the sentiment expressed by this jingle: 'I can live with my arthritis, My dentures fit me fine. I'm getting used to my bifocals, But, oh, how I miss my mind!' I hope other classmates have not reached the point when they don't remember names and faces as well as they once did, or worse, fail to find the better word while talking earnestly. Growing old is something you may be happy about only when you balance the condition against the only other alternative. Hope you enjoyed a pleasant summer. As for us we hope to visit with Katherine's family in Colorado."

We regret to advise of the death of **Rudolph Fox** in Denver, Colo., on August 7, 1970. We had written him that week inquiring as to his health but the letter was returned. Subsequently, we were informed of his passing by Alvah E. Moody, '17, a long time friend, and later by **Fritz Shepard** who knew him well. Rudolph's history was published in the December, 1967, issue of the *Review*. He is survived by his wife, Karen, and two children, Phyllis (M.I.T. '49 and '54) and Denton, both of whom are professors, in Newark College of Engineering and University of Toronto, respectively. Rudolph retired as president of the Vulcan Iron Works, Denver, in 1952. We have written his wife and daughter, expressing the Class sympathy.

**Fritz Shepard** writes that he and Betty enjoyed a good summer at Marblehead as usual, and that they saw a good deal of their daughters and families who live nearby. They have seven grandchildren, two of whom graduated from college this year. . . . **John Lenaerts** writes that he and Marion spent most of the summer in Florida this year but went up to Cape Cod for September and October after which they took a trip to Maine.

You will recall that we recently published a story by **Wallace Murray** of his trip, last year, to Antarctica. Last July he took a month's safari to the Amazon, visiting Brazil and Peru, and spending 11 days in a houseboat on the Amazon. We must postpone this story as well as that of **Willis Salisbury** regarding the trip he took to Great Barrier Reef, Nationalist China and Japan, until a later issue when we may have no other news. Things are looking up; we never even imagined that we would have too much material to print. But do not let this deter anyone from writing. In fact, we have just learned that **Harold Mitchell** has been busy as chairman of the local committee of the American Ornithologists Congress at their annual meeting held in Buffalo this fall. He and Mildred went to an international meeting in Holland last summer and will write us about the trip.

Last March **Larry Cummings** and Julie enjoyed a two-week trip to Guatemala, Yucatan and Mexico City. They chose this trip in order to see the people and countryside, as well as to look over the unusual archeology. Their account of this journey includes the following notes. The republic of Guatemala with a population of 6 million, has an even temperature the year round. There are some 32 volcanos near Guatemala City. The airport is most modern and the town has many new buildings and parks, also splendid old churches and a palace. At Antigua, the former capital, they visited several old homes. Then at Chichicastenango, they climbed to 9,000 feet to the very old, but first class Mayan Inn, with all rooms off a big courtyard. The old church dates from 1540 and includes the worship of pre-Hispanic deities, with the men burning incense on the steps, and making offerings of rose petals and pine needles on the stone floor of the church. There is a famous open market in the plaza where thousands of back country Indians come to buy and sell merchandise. All garden cultivation is by hand except in the rice fields. For irrigation, water is generally scooped by hand and literally thrown on the gardens. Schools are few but neat and friendly. Food and milk is furnished by "Care."

"Lake Atitlan, 10 miles by 20 miles, is beautiful and has several high volcanos rising from the lake itself. We visited some of the very primitive Indian villages, where there were always scads of children, chickens and donkeys. Fishing was good and we saw one man with snorkel equipment. Normally, the Indians spear their fish from hand-built boats, only ten feet long, and one man to a boat. When they returned the whole village crowded around with their hands out. Then off by plane to Merida, the capital of Yucatan where we found the accommodations good. A bus took us to Uxmal and Chichen Itza to see some of the famous excavations and restorations of the fabulous structures and pyramids of the Mayan civilization.

"It is difficult to describe the ruins to anyone who has not already read about



them, but we enjoyed every moment. Then off to Mexico City where we missed the annual M.I.T. get-together by a few days. I did go down to their headquarters and made myself known. As most of us have seen this city, I will not try to describe it. We saw all of the places on the usual tourist itinerary, however, including the floating gardens and the pyramids. Then we visited Cuernavaca, where Priscilla, the wife of **Jay Pratt**, has her Girl Scout activities as a national officer. At Taxco, the old silver mining town where no modern buildings may be built, we enjoyed the many small handcraft shops, especially the handwrought silver items. I must mention the iguanas we saw on the road. Many children exhibited animals up to 20" long and more. They were alive but well trussed, and the kids begged for handouts when showing their exhibits. We flew home from Mexico City to Chicago; we arrived at the start of the strike and before the big snow storm. Thousands were soon stranded at the airport. Luck was with us and we got away to Indianapolis with pleasant memories of an interesting vacation."

**Hamilton Merrill** is one of the few who have responded to our request for anecdotes. He writes from his home in Bridgeport, Conn., as follows: "Your request for anecdotes reminds me of my early experiences in the chemical warfare service in 1917. After I was commissioned through Professor Bradley Dewey, I was assigned to inspect gas masks made under army contract at the Hero Manufacturing Co., Philadelphia, although their experience was limited to tin cans and glass bottles. We had no specifications or instructions whatsoever. One day I saw some girls cementing rubber valves on the die-cast nose pieces. It seemed to me that the function of the valves was to let one breathe out but not in, and I found that they were so warped that this procedure was difficult. My superior sent me to Washington to see Colonel Dewey, who dispatched me to Akron to straighten out the problem. It was agreed that the compound was not suitable so we changed it. But someone decided to smear a bit of glycerine on the parts to make them more airtight. Soon Colonel Dewey visited us and made a test of a mask personally; he was nearly suffocated due to the use of litharge in the compound which, with glycerine, makes a wonderful cement.

"From Hero, I went to the Philadelphia laboratory. The British had just sent over data on a sneeze gas the Germans were starting to use and against which our masks were useless. Twelve new designs were soon dreamed up and 12 of us volunteered to test-wear them in a gas chamber. None worked, and we were a sick bunch of pups. Then we found that Kotex was quite effective. At armistice time, we received sample cylinders from the U.S. designed with sneeze gas in the head, and with lumps of clay soaked in creosote in the tail. When fired, they would produce a dense black smoke which held the gas close to the earth. The Germans had no protection from

their gas masks. I was invited to demonstrate the effectiveness of our masks from these cylinders and had the doubtful pleasure of standing alone in an open field with the black cloud drifting towards me. I was not too happy, but fortunately, the mask was effective."

**Charlie Webber** writes as a proud grandfather to say that his granddaughter won a beauty contest this summer in Rochester, N.H. She tried unsuccessfully to win the Miss New Hampshire contest for the state selection in the Miss America event at Atlantic City.

Last August, Helen and I enjoyed a rather unusual 4,000-mile cruise on the North German Lloyd ship *Bremen*. We sailed from New York to the Saguenay River and up the river to Ha Ha Bay. We visited the little French towns of Bagotville and Chicoutimi where it seemed that everyone in town turned out to welcome us. Then we inspected the large Aluminum plant at Arvida, Que. We next went down to Quebec City and Ste. Anne de Beaupré. We sailed along the Gaspé Peninsula and to Ingonish on the Cabot Trail which we traversed joining our ship at Sidney, N.S., with its large steel mills. From here we cruised south along the Atlantic Coast to Bermuda where we stopped for two days before returning to New York. The weather was excellent throughout and we enjoyed the trip greatly. However, our plans for a rest were not realized due to the continuous entertainment programs usual on such a trip. The frequent succession of meals and snacks wrecked our diets. We even tried dancing, to our sorrow, as the next day both of us were somewhat crippled by the unusual exercise. Yes, we are surely getting older.

Although here in Pennsylvania the leaves have scarcely started to color, it will be close to Christmas when you read this. To all our 130 classmates we wish a happy Christmas and another year of good health!—**Ray E. Wilson**, Secretary, 304 Park Ave. Swarthmore, Pa. 19081; **Jay H. Pratt**, Assistant Secretary, 937 Fair Oaks Ave., Oak Park, Ill. 60302

## 13

The year of 1970 is drawing to a close and we hope 1971 will be a happy one for us all.

Another classmate has entered the "Hall of Fame": **C. Lalor Burdick**, secretary and director of the Lalor Foundation in Wilmington, Del., received an honorary Doctor of Laws degree at Drake University's 89th commencement ceremony, May 31, for his creativity as a scientist, effectiveness as an executive, forward-looking humanitarianism and empathy and understanding which each wishes in others. Dr. Burdick, a chemical engineer and graduate of Drake University, holds graduate degrees from the University of Delaware, as well as M.I.T. Under his leadership, the Lalor Foundation was one of the

first organizations to give steady support to post-doctoral research in the field of mammalian reproductive physiology.

Doctor Burdick, with a major in engineering and chemistry in 1911, not only completed his B.S. degree at Drake University in three years, but achieved such distinction that he became one of the foundation members of the Drake Chapter of Phi Beta Kappa in 1923. He followed up with a B.S. in 1913, and an M.S. in 1914 from M.I.T. Doctor Arthur A. Noyes, Director of the Research Laboratory in Physical Chemistry, was one of the mentors at M.I.T. who encouraged Doctor Burdick to do advanced study in Europe. He sailed in July 1914 from New York on the last German liner to reach Hamburg, and studied at the Kaiser Wilhelm Institute, Berlin, Germany and the University of Basel, Switzerland, where he received the Doctor of Science degree in 1915. With the aid of Professor Kamerlingh of Leiden, Doctor Burdick, a neutral American, was able to travel from Berlin to London at this critical period. Research at the University of London led to a satisfactory description of the X-ray structure of Carborundum. He returned to M.I.T. to refine X-ray crystallographic techniques and continued the work at California Institute of Technology. Dr. Linus Pauling stated in 1959 that the techniques developed by Doctor Burdick provided the most information we have about detailed structures of substances.

Following service in the U.S. Army 1917 and 1918, as an officer, Doctor Burdick entered industry as a metallurgical engineer with Guggenheim Brothers. He later held positions as vice president and construction engineer at Anglo-Chilean Consolidated and, from 1929 to 1957, held various positions with E. I. du Pont de Nemours, including assistant to the president and chairman of boards within the complex. In addition to his many business activities, he has been deeply involved in a variety of organizations for the benefit of mankind. These include president, Christiana Foundation; founding trustee, University of Delaware Research Foundation; trustee, Delaware Academy of Medicine; member of the Board of International Planned Parenthood Federation; and has been Executive Director and Trustee of the Lalor Foundation, Wilmington, Delaware. The Lalor Foundation has been concerned with problems of world population since 1935 and gives post-doctoral support to research in the field of mammalian reproductive physiology.

**Allen Brewer**, one of our faithful correspondents, has contributed another informative feature. "I've just written to Bill Brewster as you will note from the attached copy of my letter. Here are the Xerox copies of the article on the 'Mayflower story' which I have sent to him. Since this is the year of the Mayflower Anniversary I know you and Roz also will be interested as native Bay Staters. It makes interesting reading and the authors were very well informed.

"Presently we are weathering the summer suns quite well. When it gets too hot and the bugs come out we just stay inside with the air conditioning on and work on our stamps. I'm also busy with additional chapters for my series of articles for *Industrial Lubrication*, an English publication. Some interest is being shown by the publishers in later incorporating this series with my already printed series on "Lubrication, Management Responsibility", in text book form. Hope some day to send you a complimentary copy. We went north in May-June for our first grandson's wedding (Terry, Allen Jr.'s eldest son). He hopes to graduate from the University of Kentucky next year; meanwhile he is serving in the Army Reserve Corps and doing some teaching in physical education at the university, along with his required courses. John Jr., our third son's eldest son also has been active. He graduated from Frederick, Md., High School in June and a few days later received his Eagle Scout rank in the Boy Scouts. He hopes to go on to college at North Texas State University in Denton, Texas, if the Navy Band Corps does not accept him. His interest is entirely music. Another of our grandchildren, Krista, Gordon's daughter graduated from High School in Pittsburgh, Pa. and is going to college at Dennison in Ohio. Some day we might have another Tech candidate in sight, but it does not look promising right now. This about sums up the family news. We both have now fully recovered from our surgery last fall. Now I have an incipient hernia and a cataract on my left eye to contribute to our medical coffers. No indication as to when, however. The doctors just stall and say 'let's wait a while.'"

Letter to Mr. **Ellis Brewster**: "Dear Bill: If you are not already aware of this perhaps you will be interested in "The Mayflower Story" which appeared in the July-August 1970 issue of *Topical Times*, a little magazine published in Milwaukee for stamp collectors who are active in specializing on topical collections. Maurine and I are in this category since among our other stamp interests is the subject of 'waterfalls on stamps.' Accordingly, here are three pages from this particular issue; keep them if you wish for your historical archives. We are

particularly interested in the mention of your ancestor as having once been the "postmaster" in Scrooby, England. I am sending Phil Capen a Xerox copy; he might also be interested since this is the Mayflower year. Incidentally do you have knowledge of any New England magazine which might be interested in a 'Commemorative Stamp History of New England'? I have written such a story with some of the stamps in question as illustrations." This article is very appropriate at this time when the Town of Plymouth is celebrating its 350th anniversary of the landing of the Pilgrims on Plymouth Rock in 1620. I quote: "We saw the little Church in Babworth where William Bradford worshipped as a boy. In Scrooby we attended services at St. Wilfred's Church where William Brewster, one of the Pilgrim Elders, was baptized. It was here that he succeeded his Father as 'Postmaster' until forced to flee the country. We visited Scrooby Manor where he lived and where the Separatist congregation worshipped secretly. Scrooby accepts its fame with indifference."

It is remarkable that the name "William Brewster" has passed down in history of the several communities both in England and America for nearly three centuries.

**C. Preble Wetherbee**, 1200 Roberts Ave., Mays Landing, N.J. 08330, writes: "I don't know whether you will welcome a letter such as this, but I imagine there are many others 'in the same boat'—who live outside the New England area and don't know too much about what is going on up at M.I.T., particularly in regard to student campus revolutionaries and how the Institute reacts to them and matters of that sort. I know that President Johnson did send out one report some time ago on such activities, in which as I recall, student revolutionaries took over the administrative offices, but unfortunately I didn't remember any further reports.

Mr. William S. White, in my judgment one of the most respected of the syndicated news columnists, in the early part of the year mentioned M.I.T. on two occasions in the most scathing terms. I wrote President Johnson, enclosing one of Mr. White's articles, and calling attention to the unfavorable image that

M.I.T. seemed to be getting. With some few exceptions, the indictment of college presidents generally, by those individuals and commissions who have studied the matter, seems to be that they lack the 'guts' to meet tough situations head-on, irrespective of how good or even outstanding educators they may be. Whether Johnson is 'tarred with this brush,' it would be unfair for me to hazard a guess, but he did admit in his recent statement of September 9, that college and university presidents 'are the most expendable part of the process.'

"What I am trying to get across, I guess, is that I wish somehow, those of us who live in 'outer space' could be kept better informed of what is going on up at the M.I.T. campus. Maybe you can put a 'bug' in somebody's ear, or, when the incoming mail is light, add a few notes of your own which you might think would be of interest, in the Class Notes in the *Technology Review*." It is my firm belief, classmates, that we shall be enlightened to all phases of the causes and the cures of this present educational dilemma. One source of enlightenment is the recent report of President Nixon's commission on campus unrest.

A letter has been received from Robert Pastene, 1724 Colfax Ave. S., Minneapolis, Minn. 55403, notifying us of the death of his father and our classmate from 1909-1913, **Alexander J. Pastene**: "A memorial service was held August 29th in Sudbury, Mass. for Alexander J. Pastene, 1913, who died July 23rd in Traverse City, Mich. He had retired in 1957, after 29 years' association with the Monsanto Chemical Co., in St. Louis, Mo., and since 1961 had made his home in Sudbury. He is survived by his widow Virginia, his daughter, Esther P. Steinmetz, Jr., his sons Robert and A. Jay, and five grandchildren." The members of the Class of 1913 offer sincere sympathy to the Pastene family. A note of sympathy has been sent both to Virginia and older son, Robert.

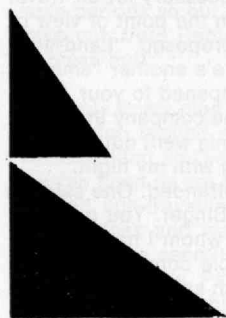
We must report the death of Mrs. Grace (Jamison) Burnham at Brockton Hospital, the beloved wife of **Harry G. Burnham**. She is survived by her husband, Harry G.



Burnham, a stepson, C. William Burnham of Weymouth, a stepdaughter, Mrs. Elizabeth Coyle of Weymouth, a brother, Milo Johnson of Brockton, and four grandchildren. We, Harry, extend our condolences in this hour of grief.

It was with deep feelings of regret to most if not all of the fellow alumni when Dr. James R. Killian, Jr., '26, announced his retirement effective as of June 30, 1971. Your Secretary has enjoyed the friendly association of Jim Killian over the many years ever since he graduated in 1926. His accomplishments concerning M.I.T. have been outstanding, both as the President and subsequently as Chairman of the Corporation and concurrently as a technological and science advisor to the last four Presidents of the United States. Now, again, we are somewhat frustrated on learning of the self-retirement of President Howard W. Johnson, as of June 30, 1971. The Alumni, Faculty, and the students of M.I.T. have all benefited under the five-year leadership President Johnson has provided. The announcement that he has accepted chairmanship of the M.I.T. Corporation should assure all of the alumni, faculty, and students that our Alma Mater will still continue as one of the high-ranking institutions of the world.

Again the fine hand of our Class President, **R. Charles Thompson**, is in evidence. He has advised your Secretary that he needs an assistant, so after due impersonal consideration, Rosalind R. Capen has assumed the duties of the Assistant Secretary of the M.I.T. Class of 1913. To all of you boys and gals, the Capens wish a very Merry Christmas and Happy New Year.—**George Philip Capen**, Secretary and Treasurer, **Rosalind R. Capen**, Assistant Secretary, 60 Everett St., Canton, Mass. 02021



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## Technology Review for Christmas 1970

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We are indebted to **Roy Parsell** for the news note about **Homer Calver** from the *New York Times* of September 17, 1970. "Homer N. Calver, a noted health educator, died Tuesday in Memorial Hospital. He was 77 years old and lived in Clinton Corners, N.Y. Mr. Calver graduated as a sanitary engineer from the Massachusetts Institute of Technology in 1914. He served as a captain in the Army Sanitary Corps in World War I.

"He was named executive secretary of the American Public Health Association in 1923 and editor of the *American Journal of Public Health* in 1925. From 1928 to 1932 he was assistant professor of hygiene at New York University Medical College. Mr. Calver founded and for 10 years headed the association's scientific exhibits committee. He organized and served as secretary of the Committee on American Museums of Hygiene, until it was merged with the American Museum of Health in 1937, when he became secretary and director of the new museum. He planned and directed the health and medical exhibit of the New York World's Fair in 1939-40. Since 1945, Mr. Calver had been director of the Bankers Federal Savings and Loan Association and a director of the Association for Voluntary Sterilization.

He is survived by his widow, the former Elizabeth Lappe; two daughters, Mrs. Edward O. Malott, Jr. and Mrs. R. Boyd Ladd, and six grandchildren." We will miss Homer, whose doings have been a welcome addition to these notes, and ours as well as the sympathies of the other '14ers go to the family which he leaves.

**Bert Hadley** came to M.I.T. from Middlebury. We understand that a building at Middlebury is being named for Bert. Congratulations! . . . We have a nice gossip letter from **Harold A. Mayer** who lives in Portland, Ore. (It was particularly reminiscent of Harold Richmond.) Harold lives with his son Denny who will be in his senior year at the University of Oregon Medical School soon. . . . We had a chat with **Dinny Chatfield** who just returned with his family from a continental tour of Norway, Denmark and Sweden. The trip was apparently very successful except that Lois had a slight accident in which a bone in her arm was fractured. They learned that medical treatment for ailments of this sort are treated absolutely free for everyone in Sweden.

**Les Hamilton** reports that things are going along quite peacefully at the Institute, although there is a guard at the President's office door. Apparently there is no indication thus far as to who may succeed President Johnson in the future. Merry Christmas. See you next year.

—**Herman A. Affel**, Secretary, Rome, Maine, P.O. RFD 2, Oakland, Maine 04963

## 15

Our October 23 class dinner, here at The M.I.T. Faculty Club, will be reported next month. We've had an unfortunate and regrettable experience with the photographer who took our reunion picture at Poppanessett. At the end of three months he hadn't delivered the pictures, so finally, George and I had to go down there to settle it, so by now, you must have your pictures. . . . Fran and I were unable to make our annual summer trip through northern New England to see Elizabeth Baker, Phil and Helen Alger, Boots and Helen Malone and Pop and Charlotte Helen. But, we'll try to make it up later. . . . Now for news from our good classmates far and wide.

**John Dalton**, of Providence: "I am well acquainted with Lucius's [Bigelow] activities and I reassure you all that he is a remarkable person to carry on as he is doing with his impaired vision. He deserves considerable credit. I recall him well at our 50th." . . . **Harold Edgerton** recently made a hole-in-one at the Lake Venice Golf Club in Florida, where he plays regularly and keeps in good health.

**Charlie Gardiner**, of Cleveland:

"I retired on January 1, 1970. My wife and I spend our summers at our small shore place near New London, Conn., where we've been going for 46 years. For the past several years, we have been travelling about the world, as I now have more time for it and other activities such as history reading, bridge and Rotary work. My first perusals of the *Review* are always the 1914 and 1915 class notes. You do a wonderful job, Azel, and well merit a world of appreciation from your classmates." Thank you very much, Charlie, for those kind words. They keep me going when it gets tough on this job.

Congratulations to Marjory and **Joe Livermore** on their 50th wedding anniversary, September 26. Joe wrote "I am still reliving the great time we had at our 55th down on the Cape. I just can't realize we have been out in the world that long. I am still working and we expect to turn over to the owners at the end of the year a twelve million dollar plant. What's next? We have been home all summer with occasional visits from our son, daughter and grandchildren. Marj and I are going to Bermuda as a special for our 50th wedding anniversary." Congratulations to this young couple. . . . **Ernie Loveland's** letters have carried us across the other side of the world in far away and strange places on his weird and colorful experiences. He is now back in the hospital for special surgery in New York City. You can read what a tough time he has had with such delicate and special surgery. We all must admire his grit, determination and courage and wish him well with all the best and good cheer for his recovery. "When I came to New York from the Philippines it was with the hope that I would be able to learn of some special surgery that would improve my condition

so that I could again walk normally and without a walking aid. I was referred to a specialist, he brushed off my inquiry and wasted 3 months giving me completely ineffectual steroid injections. Then after 3 months he sent me to one of the few surgeons who are performing a new operation. I was only the 8th one when he made this operation and perhaps my first doctor was waiting to see the results on No. 7. I understand that the first 7 operations were all successful and so far I have no reason to believe that we shall not be able to say that the first eight have been successful. . . . my recuperation speed has been fully up to normal. . . . My entire right hip bone was cut off and thrown away and replaced by metal and the knob on top of my right thigh bone replaced by plastic—a 'total hip replacement.'

"The surgeon has told me that I shall, after a while, be able to walk normally without any aid. I do not yet know when I am expected to leave here but yesterday in Physio-Therapy the technician told me that I would probably have to use crutches for a while after I was discharged. I sure will be glad when I get back to normal again and hope I shall have been in the hospital for the last time. I hope to be back in Marion one of these days, but no guess has been made yet as to my discharge date."

**Mary Plummer Rice** has been travelling around Europe all summer doing her good bit for the Red Cross and U.S.O. From London, she wrote in August: "My eight weeks in wonderful England are coming to an end and I hate to leave. The shows are so superior that I don't want to miss a single one. I am at a hospital in London five mornings a week. It's very different from our American Red Cross." Previously, she had been in Iceland, Holland, Germany, Vienna, Yugoslavia, Italy and Luxembourg. She said there were labor strikes everywhere. How does she do it? Credit and praise to her. . . . At the annual Founders' Day dinner of the Baltimore Engineering Society on April 22, **Bill Spencer**, a past president, was presented the Founders' Award. The citation read: "In recognition of meritorious performance in advancing the engineering profession through his engineering talents, his contributions to technical knowledge, his inspiring and counseling of engineers, and his fulfillment of civic responsibilities." Bill was described as "a fine man of figures and a grand figure of a man." Some time ago Bill received the Silver Beaver Award of the Boy Scouts of America. Nice going, Bill, and congratulations from us all for such a high honor.

It's sad to report the death of **Bill Mellema** on August 7, in Glendale, Calif.; and **Lous Zepfler** on August 18, in Duluth. **Ray Stringfield** wrote about Bill: "Guess we have to admit that our Class is thinning out as we get older. Bob Welles and I attended the funeral for Bill Mellema who passed away on August 7. Bill has been out here since 1924, and was well known as an architect, among other

things supervising the construction of many schools for the City of Glendale and stores and warehouses for Safeway. He had also been active in Kiwanis and the Masons. I had known him since 1913. He had a degree from Amherst and got one in both architecture and structural engineering at M.I.T.

"**Bob Welles** is as sharp as ever, altho his hip bothers him quite a lot and he uses a sort of crutch cane for safety. He and one of his daughters and her husband are leaving for Paris in about 10 days, (his wife passed away several years ago), which is like going home for Bob as he lived there for several years back in the 20s. I still don't know enough to retire, and lately the attorneys have been running me ragged reporting on tire accidents. Sorry we couldn't get back to the reunion in June. You and Fran better take another trip out here. We understand the smog is getting to be as bad in Boston as it is out here, but we can take you to either the beach, the desert or the mountains. Best regards."

Louis' sister Elizabeth Gartner wrote: "He had been living in Tuscon, Ariz., for some years and spent his summers at his lodge in McGregor, Minn. He went into St. Mary's Hospital, Duluth, for surgery which he survived reasonably well. But a few days later he succumbed to a heart attack. Heinie, my husband, Class of 1917, died of cancer on June 20 just a few weeks ago. Stan Dunning, the 1917 class secretary, has all the facts. I hope your Class had a good reunion in June. My brother was very disappointed that he did not feel able to attend." The sympathy of our Class goes out to the families of these two classmates.

**Bob Welles** wrote when he was travelling in France with his daughter and her family; at the time they were sightseeing in the Alps. We were all delighted to see Bob at our 55th reunion. And, now, as the year closes, to all my classmates and their families and to all our "reading public," a happy and healthy holiday season with all the best for good cheer in the New Year.—**Azel W. Mack**, Class Secretary, 100 Memorial Drive, Cambridge, Mass. 02142

## 16

When these notes reach their readers the Christmas season will be upon us and your secretariat extends greetings to all who may peruse them. As of this writing your secretary has called in the assistant secretary to pinch hit for him until he regains his usual robust condition, which we all trust will be soon.

From the notes turned over to me the following items have been culled and arranged more or less alphabetically by name. **Paul Austin** sends a copy of *Bechtel Briefs* for May, 1970, featuring a copper mining operation he is involved in on the island of Bougainville in the Territory of Papua, New Guinea. In 1964

a band of geologists discovered some interesting rock samples on the floor of the rain forest. Subsequent exploration determined that the geologists had made a remarkable find—copper ore samples indicated an ore body estimated at one billion tons. Today the island is well on its way to becoming the site of the largest grass-roots copper mining and concentrating venture ever undertaken. Life on Bougainville is in the throes of unprecedented change.

We regret to report the death of **Dana Barker** on August 23 in Rozelle, N.J., following a short illness. Dana was born in Wilton, N.H. and attended Phillips Andover Academy before entering M.I.T. He retired in 1956 after many years with the Union Carbide Corp., at Bound Brook, N.J., as a chemical engineer. His entry in the 50th reunion history notes that what gave him his greatest satisfaction in his professional career was the "development of new cycles and oven to planish and laminate different types of plastic;" until recently he had been a consultant in plastics. For the past 32 years Dana had lived in Roselle and before that in Elizabeth for 10 years. He was a Past Worshipful Master of Tyrian Lodge 134, F & A.M., Elizabeth. Dana leaves his widow, Julia Bischoff Barker, a son Dana N. Jr., of Hanover, N.J., a daughter Adrian J. Barker of Millington, N.J., six grandchildren and one great grandchild.

**Dick Berger** sends us a clipping from the *Sterling Observer* of Scotland indicating that his well known interest in cancer prevention is recognized beyond the reaches of his own country. . . . We spotted a letter to the editor of the *New York Times* of August 28 from **Walt Binger**, who, as always, has conservation at heart. His thesis is that the proposed extension of the runways at Kennedy Airport (N.Y.) into more of Jamaica Bay is unnecessary for air travel and undesirable from the point of view of President Nixon's proposed "Land-use Policy." . . . And here's another "small world" item that happened to your Assistant Secretary: The company that flies from Boston to Laconia went out of business—beginning with my flight. Several of us were stranded. One said his name was Bronson Binger. You guessed it; it was Walt's son whom I had never met. A most agreeable companion on a chartered flight which saved the day.

It was good to hear from **Jack Burbank** that he was getting back to normal after a tough winter. He writes, "I am playing golf again, nine holes, and riding a cart. My last four scores were 43, 47, 44 and 43 at Wianno. I have dropped off my excess weight from 183 two years ago to 155 now. I really feel a lot better and it sure has helped my golf game. I am watching the foods by shooting for 1800 calories a day. Social life is largely dinner and bridge with friends. One grandson has graduated from Brigham Young University and one granddaughter entered Ithaca College (not Cornell) this fall. Another grandson graduates from



Choate next June and wants to go to Colby in Maine. I can only say three cheers for Mary Hitchcock Hospital (Hanover, N.H.). They did wonders for me from May 26 through June 12. There's nothing else like it in New England. Just think, their internal medicine staff has 17 M.D.'s."

There is a little gem of an essay by **Vannevar Bush** titled "The Builders", written in 1945, published by the M.I.T. Alumni Association and republished in the May 1970 issue of *The Physics Teacher*. The essay compares the educational process to the building of a cathedral, from the quarrying of the stone on—a masterful bit for reading and rereading. We'll make a copy for you if you'll write us. . . . **Arthur Caldwell** dropped us a card to say all was well with him at Meadow Lakes in Hightstown, N.J.

We who attended the 54th reunion at Chatham Bars Inn are indebted to **Charly Cellarius** for his devotion to photography. He has sent on many excellent prints which will be on display at our 55th, now scheduled for June 8-10, 1971, again at Chatham Bars Inn. He also writes, "I spent three weeks this spring in Guadalupe and a week in Florida. Since I retired I have been too busy doing nothing useful to have had time for serious matters." (Hear, hear!)

We had a nice letter from **Joel Connolly** from Brewster on the Cape telling of old friends from Manila. The Connollys were in Manila from 1952 to 1955. They leave Brewster for Tucson before long. . . . From East Falmouth **Theron Curtis** writes, "No plans for the winter but may go to Clearwater again in March for a short stay. Will be in Boothbay Harbor in late September for a change of scene. Long hot summer here most of the time. Plenty of exercise: swimming, cutting grass and trimming trees, entertaining grandchildren and great-grandchildren—for reasonable periods so our old nerves didn't give out. Vote Republican and kick the Hippies out!"

On reply to my plea for news, **Frank Darlington** replied as to a questionnaire, to wit: (What you've been doing? Where you've been or are going?) Mrs. D. and I did all our travelling years ago: we are not restless and we love our comfort. (Who you've seen?) Most of our friends are in Leetsville, Pa., and Hyannisport, Mass. (What the children or grandchildren are doing?) Older daughter is helping her husband with mercantile pursuits and extensive travelling; younger daughter taking care of her family including three young grandchildren in Hyannisport where they now reside; son in New York working with *Newsweek* as Senior Editorial Assistant. (As a special treat a bit of philosophy.) The kind of society the young long-hairs would foist on our poor country—if, indeed, they have any concrete plan at all—certainly makes death much less unattractive."

**John** and **Gladys Fairfield** tell of a pleasant visit to Huguonot Street in New

Paltz, N.Y., "The oldest street in America with its original houses." The town was founded in 1678 and is located in the Wallkill Valley near the foot of the Sawangunk Mountains only 70 miles from New York City.

I saw **Grace** and **Ed Graustein** in late September and he also writes that he's been playing golf three times a week. He attended the wedding of his godson in San Francisco. He saw the prairies, deserts and Rockies from 7 or 8 miles up but on both coasts the weather shut in on landing. "Had my seat belt on at landing in Boston but the lunch tray was without one and kept on going, demonstrating one of the laws of motion." Ed has an accumulation of material from 20 years of activities which he is organizing and giving some thought as to sponsors and publishers. "Like Schaefer beer, I am having more than one." . . . Our Continent-hopping classmate **Rudy Gruber** went off again to England and Europe on August 25, for four or five weeks with relatives and friends. He writes that the high point of his June-July trip was a meeting of the Nobel-Prize Laureates at Lindau, Germany. It was the 20th meeting of the group and the program was headed by the chemists. **Rudy** returned on a Pan-Am 747 Jumbo and noted, "The flight was excellent and so was the service, but the thrill of flying was missing. You feel as if you were in a comfortable lounge of a luxury hotel which shakes a little."

Our Polar Bear Club swimmer **Cy Guething** is still doing it in Boothbay, Maine. He writes, "The old fog is in again but I shall climb thru it and take my second swim of the day. The water is about 60 degrees and should wake me up after a nap. We are slowly packing to return to Birmingham after a pleasant five weeks here. We have had poorer weather than average. **Mil** and **Charlie Reed** drove down from Wayne [Maine] and we had a most pleasant day with them. . . . We are already planning for the 55th reunion to be with you wonderful people again." . . . I talked with **Phil Baker** just before he left with a local group of about 25 for Greece. He expects to replenish his wardrobe over there, "Never had better crops than this year. Am taking advantage of some good weather to paint the trim on our little house."

We finally caught up with **George Hale** who now gives his address: Care of C. S. Robinson, Maple City Route 2, Mich. 49664, instead of the Golden, Colo. address. He writes that he is now located on the East shore of Glen Lake, west of Traverse City which, according to the Chamber of Commerce, is the Cherry Capitol of the World. It is also the location of numerous Petosky stones (petrified coral) which are like small skipping stones somewhat smaller than a silver dollar. **George** tells us that they were once living corals growing in the warm salt seas which covered Michigan about 400 million years ago. They have been proclaimed the official state stone by the

Michigan legislature. The word **Petosky**, meaning Rising Sun, was the name of an Indian chief who controlled the area when the settlers first arrived in 1852. **George** is now living alone in a small cottage about a hundred feet from the main cottage where his daughters (2), grandsons (3) and a great granddaughter, two years old, are staying. His in-laws obtained the property 30 or 40 years ago. He is well and enjoying a somewhat cool, frequently showery and windy summer and contributes the following "chuckle": "There is golf and tennis/and games more strenuous/but the best I can do/is to push 82."

A letter from **Frank Hastie** tells of a good July on the Cape after an exhausting automobile drive during a hot spell. With his own white beard, Christopher medal on a lariat tie and most informal hot weather attire he was constantly greeted by the many long haired young people in a very fraternal manner. **Amelie** (Mrs. H.) finally stopped taking it as a compliment to his distinguished and benevolent appearance. They say it was never hot on the Cape before and the lack of air conditioning in the houses and hotels seems to bear this out. He says not to plan to take the ferry from Woods Hole to Martha's Vineyard in the summer unless you make a reservation in March or April. I take it that plan was abandoned.

**Frank** says he's like the old native in Maine when a summer visitor remarked that he must have seen lots of changes during his lifetime said, "Yes, and I was again every one of 'em."

The October-November notes reported the death of **Harry A. Levine** on April 27. We have subsequently received a most friendly and appreciative letter from **Florence**, his wife, including a clipping from *The Jewish Advocate* of April 22, 1965. It records his selection as the first "Man-of-the-Year" of the Jack Wilson Memorial Meeting, and outlines the reasons for his selection. The clipping records the high esteem in which he was held by his associates.

Another response keyed to our plea for news in questionnaire style comes from **Charlie Lawrence**. He reports one grandson in the army air corps, helicopters etc.; one grand nephew in the infantry in Germany after a full tour of duty in Vietnam; several finishing high school and two in college; the balance are in public school, various levels—all 18 well and lively. **Charlie** still hopes to visit two children and families on the Pacific coast and in the Mid-west this fall by jet.

One family is just back from two years of medical service in Japan. "**Loie** and I are living quietly with visits from descendants of the California **Lawrances** for four to eight happy weeks of lively times. Learned a bit of philosophy of militant teenagers on the west coast. Their world satisfies them so long as we produce the comforts and conveniences they like and deserve and do not demand too much work from them in return. . . ."

One of our classmates is a craftsman par excellence and proves it with pictures of a beautifully carved chest designed from a Mexican work of art. Said craftsman is **George Maverick** who writes of our 54th reunion, "At the end I feel we were in general agreement that the school we'd been so proud of in 1916 merited more appreciation now. I sensed a general feeling that M.I.T. could expect our backing in these revolutionary days."

Further he says, "We've been well and working hard on our wild acres; one favorite grandson stayed most of the summer and helped us fight off the jungle. We go into the fall and winter with far more confidence than we had last year at this time." . . . **Ed Parsons** writes that the social whirl at Jamestown, R.I., hectic as usual, has been augmented by the Americas Cup contenders whom and which he has watched from his sun-deck overlooking the water since the trials started. Some eight 12-meter boats have been on display at one time or another. Ed attended Hovey Freeman's funeral and it seemed that every important businessman in the state was present in the packed church in Bristol. "He was a great man whom I have known all my life." Last fall Ed and Mary made a long auto detour on the way back to Islamorada (Florida) taking in the Pacific Northwest including the Tetons, Banff, Lake Louise, Jasper, B.C., Seattle (beautiful), the Oregon coast, California redwoods and a month's stay at the LaJolla Beach and Tennis Club. While there they saw Ke and **John Ingle** who look much the same as ever. After visiting a son in Houston and a daughter in Memphis, they arrived back home on November 1 for their six months' winter stay. Ed occasionally sees Clair and **Arvin Page** on the way to or from Florida; Arvin still plays golf.

From Phoenixville, Pa., **Ted Parsons** writes that he and his wife are leading a quiet life in the country and do not get around much as they have trouble with locomotion. In writing a while ago he presented me with a middle initial of which I am bereft. On asking what it was for he was reminded of a similar situation with his brother who entered "none" on a job application form so subsequent correspondence was addressed to Robert None Parsons. "Sometimes it seems that difficulties can be created where none exist." . . . **Elizabeth Pattee** sends us a post card showing the location of her summer home which she built in 1930. It is on the southeast corner of Cape Small, in Casco Bay, some twenty miles east of Portland, Maine, as the crow flies. During the winter she lives at Meadow Lakes, Hightstown, N.J.

The "Squire of Plymouth Plantation," **Dave Patten** writes of a trip he and Dorothy took to look over a 133-acre farm property in Hampton Falls, N.H., up for sale by William Coburn, Class of 1912. He writes, "Anybody want a New Hampshire farm, fifty minutes from Boston, in apple-pie condition?" He also writes, "Since I knew David Bruce well

in the E.C.A. days when we were both on Averill Harriman's staff at Mission Chiefs, I wrote the President to congratulate him on Bruce's appointment to the Paris Vietnam Commission. Received a thank you note, Bruce will be successful." . . . Convalescing from a recent bout in the hospital **Allen Pettie** writes, "The operation was successful and the patient lived but the recovery time is long, about two months, which seems to be par for the course." As to the Fisk Committee he wonders if it wouldn't be too much for them to attempt to come up with the entire detailed job of reorganizing the whole Institute as well as to find a new President which he assumes is their chief function.

In an article of some six full columns titled "New Cities" in the August 16 magazine of the *Boston Sunday Herald Traveler* (forwarded by Nat Warshaw), we see a picture of **Izzy Richmond** plus an aerial map of an 1875 square-mile area of upstate New York. We read how Izzy, while flying his own plane, got an inspiration—instead of trying to renew old cities we should be building new cities. Also we read "President Nixon, in his state of the union message on January 22nd, said that the violent and decayed central cities of our great metropolitan complexes are the most conspicuous area of failure in American life and that the federal government must be in a position to assist in the building of new cities and the rebuilding of old ones." Izzy says: "Urban development as a solution to city problems can never work. No matter how much the governments appropriate or how fast they build, the population explosion produces people faster. The consequences are housing shortages, clogged streets, inadequate schools and a general downgrading of life." There is much more of great interest, too much to be digested here. Perhaps copies can be obtained from the publisher. Incidentally, Professor Jay W. Forrester of the Institute has made extensive studies of the urban development problem some of which are available in print. (See *Technology Review* for February, 1970, pp. 19-20.)

Our outstanding class golfer, **Frank Ross**, is outstanding in much wider fields as we all know. It may have been omitted from our earlier notes, but in 1967 Frank was awarded the Distinguished Senior Award by the American Senior Golf Association. This list of award recipients has only nine names on it and he is indeed in good company; other recipients include General Eisenhower, Francis Ouimet, Bob Jones and Chuck Evans. He adds, "As a golfer, the old gray mare ain't what she used to be."—wonder if he has trouble breaking par these days. Frank also writes that all's well with them and they certainly do enjoy Naples (Florida) even in the summer. . . . Our old car buff, **Henry Shepard**, continues to be rewarded for his skill at this avocation and writes, "In August my 1913 Chalmers won 2nd prize in its class at the big old car meet of the year at Larz Anderson Museum in

Brookline. There were 214 cars in the meet. Frances and I enjoyed our summer in Randolph, N.H., with the usual activities of swimming and hiking. It went all too quickly. With smog increasing around here all the time, one enjoys the pure air of our 1,800 foot elevation. Before coming home last week I split a cord of fireplace wood for exercise and the need of getting back into shape for the winter curling season."

In a letter from **Blythe Stason** we learn that after five years of service he has resigned as Frank C. Rand professor at Vanderbilt University Law School.

He writes, "The close approach of four score years made the resignation seem desirable. I confine my activity to some consulting work at home in Ann Arbor. I was honored and pleased to have my 'Law Alma Mater,' the University of Michigan, award me an honorary Doctor of Laws degree at this summer's commencement exercises. Michigan does not often extend such recognition to its own former executives, so I feel especially honored."

At this writing our Treasurer, **Francis Stern**, is in England. The trip is a birthday party for Gladys who had a tough winter and a hospital spell in June. He writes: "We fly September 14 from Bradley Field (Hartford). Two days at the Dorchester Hotel, then six days motoring in Southern England. Back to the Dorchester till October 3 when we fly home. All this with my dearest friend Edgar Weil and his wife. He was Course II, Class of 1913, and a fraternity brother. They fly from Cleveland the same day we do and arrive within five minutes of us. Their two sons and their wives fly over September 25 to all be together on Mrs. Weil's 70th birthday. Both sons have some English business to do, so it makes a chance to be with their parents on Mother's big day. Incidentally, the Weils have an apartment next to ours in Palm Springs and we winter together."

How to give you the gist of **Nat Warshaw's** contribution is a problem; he sent in such a lot of interesting and important material. The article on Izzy Richmond is covered separately but he also sent a condensed version of the testimony by S. I. Hayakawa, President of San Francisco State College, before the President's Commission on Student Unrest. In miniscule, he advocates a program of compulsory national service for all youth and Nat, in a letter to the editor (*Boston Herald Traveler*) endorses the plan giving his own experience as an example. Nat writes: "You know, a funny thing has happened to me since Martha (Mrs. W.) became ill. It means I'm home with her all the time except the few hours I'm at the office each day. As a result I get to read the papers and magazines more thoroughly. Then if I see something that starts me thinking I may write something about it. The next thing I know I'm writing a lot to the same people or others. . . . Well, here's a case in point. (the Hayakawa report) . . . I've also



become very interested in what John Garner, ex-head of H.E.W. is promoting: a third force, not a third party, a 'People's Lobby' as I get it, because other lobbies are pressuring our elected officials and others so much that they can't look after our interests. 'If you can't lick 'em, join 'em.' "

And thus endeth the summary of news received from classmates to date. Harold is at home again and we trust we will read his inimitable notes before long. To keep the slogan going: Write us often, even if only a little but the more the merrier and your willing-to-work secretaries will spread the word.—**Harold F. Dodge**, Secretary, 96 Briarcliff Rd., Mountain Lakes, N.J. 07046; **Leonard Stone**, Assistant Secretary, 34-16 85th St., Jackson Heights, N.Y. 11372

## 17

You will be reading this about Christmas and New Years time when customary wishes and exchanges are made. From our viewpoint we can be critical, super critical or even hopeful of our future. It is so easy for us to forget events of our youth which our parents took as frightful forebodings. As we come to the New Year let us greet it hopefully in the anticipation that all things will work for the best, and may the true spirit of Christmas be with us.

Two things are foremost right now—sending these notes in on time and preparations for the 53rd reunion at Northfield next week. As of the moment 33 men and 26 wives are registered and a good time should be had amidst the fall foliage. One disappointing thing has happened; **Dud Bell** will not be there because of ill health. His doctors have advised him that circulatory troubles make his chairmanship and attendance impractical. He surely has our best wishes for a speedy recovery. Dud hasn't been able to reply yet to the comment **Loosh Hill** made on the reunion return post card to wit, "Watch your language! Who in the Class knows what a 'melange' is! Probably pornographic! Cheers!"

Fiftieth anniversaries continue to be in the news. **Ray Stevens** and Katherine celebrated their 50th wedding anniversary September 4 in Canada where they went for a short trip to Quebec and Montreal after a quiet dinner with their immediate family.

**Ken Bell** and Vera had their 50th September 12. Their son and three daughters with respective spouses, nine grandchildren and a new great grandchild arranged dinner at the Lenox House, Lenox, Mass. Of the original wedding party **John Holton**, best man, Sally Holton, matron of honor, and **Ray Stevens**, usher, were present. John designed and lettered a beautiful scroll for the occasion. Another 50th for Ken was the recognition given by the Northeastern Section of the American Chemical Society for his 50-year membership. Ken

continues consulting work with foreign governments on leather technology and has been outside the continental United States on some five trips this year.

**Cy Medding** writes from Springfield, Va., that he is a bit wobbly but hopes to get to Northfield. He is just out of the hospital after being, as he says "electrocuted" by the shock treatment to get both parts of his heart working together. Thoughtfully he enclosed a newspaper clipping about his philatelist activities which includes the following excerpts. "Eight-year-old Walter was given about 300 stamps by his father. From that beginning he has built a fabulous stamp collection which covers eight book case shelves. His foreign collection alone fills 34 volumes. Two more volumes hold U.S. stamps. Thirty to forty albums are filled with duplicates which he trades or sells. There are 1919 issue U.S. Postal Agency in Shanghai stamps; also rare 1917 red 5 cent stamps printed in error when only 2 cent stamps were printed in red. In 1930 the Colonel bought 3 Graf Zeppelin stamps for \$4.55. The issue did not sell so was destroyed. The catalogue value today is \$600." It is a fascinating story but unfortunately too long to quote in full. (Thanks, Cy, wish others would contribute their stories. Sec.)

**Bill Dennen** had a hip operation at the Valley Forge General Hospital in September so couldn't take in the reunion. . . . **Elizabeth Gartner** will continue to live at Wellfleet on Cape Cod although she is selling the antique furniture restoring shop that she and Heinie developed. . . . Although **Jack Wood**'s sailing activities are now at San Diego, Calif., he isn't forgotten in Boston. A September newspaper picture shows two 13-year-old boys winning the Walter Cromwell Wood Trophy in the Massachusetts Bay Midget Championship races on the Charles. . . . **Dick Whitney** was the information source on the 14th annual reunion of the Early and Pioneer Naval Aviator's Association held last May in Pensacola.

**Frank Crane** and his English wife divide their time between her home in Newbury, Berkshire and his in Carmel, Calif. He writes, "Just now we are enjoying a two-week 'holiday' in beautiful Cornwall, which scenically is very much like the Monterey Peninsula. I enjoy the low-key life here in England but do like to get back to sunny California before winter sets in." . . . The **Walt Beadles** expected to attend our reunion. Instead he has to testify for the government in a mail fraud case in Jacksonville at that time. During July they had a delightful three-week cruise aboard the M.T.S. *Argonaut* with a group from the University Club of New York. In addition to Copenhagen where the cruise started and ended, they visited Stockholm, Leningrad, Helsinki, Visby on Gotland, Ronne on Bornholm, Helsingor, Oslo, Bergen and the fjord country, going as far north as Trondheim. . . . **Dick Catlett** at Richmond, Va., has really joined the ranks of the retired by virtue of having sold his last holdings in the air conditioning company he started in 1936.

Thanks to all who returned the reunion post card or have written, even if there was only a signature. There should be good material for our January notes. Health and happiness to all of you in the New Year.—**Stanley C. Dunning**, Secretary, 6 Jason St., Arlington, Mass. 02174

## 18

Have you ever wondered what it is like to be an M.I.T. undergraduate today—whether you could make the grade now? In a very small way I decided to find out; so last September, I attended a freshman physics lecture. There were about 30 young men and six co-eds in the classroom. I found them attentive and eager—they listened closely as Professor Hulsizer expounded on Newton's laws. The students were well-dressed by today's standards—coatless and tie-less. Most of them were clean shaven, a few were bearded, and a few blacks wore their African hair do's and coats. The demonstration equipment is modern, with new visual aids. I could have closed my eyes and believed that Professor Charlie Cross was expounding (except that Professor Hulsizer had a more powerful voice). At any rate, for the record, let me state that: (1) if we were freshmen now I believe we could make the grade even as we did in the long, long ago; and (2) that if this class is a fair example of today's M.I.T. undergraduates, they are an asset to our Alma Mater and are maintaining the tradition of high quality at Tech.

Recently I spent an evening with **John Purves** who lives close by in Cambridge (within a stone's throw of Harvard Yard). He came to M.I.T. in 1914 from Philadelphia and enrolled in Course I. Jack's studies were interrupted by army service in World War I, but he returned to receive his degree in 1920. His first business connection was with Lockwood Greene Co., for whom he worked two years. This was followed by an association with the American Chain Co. as an engineer, developing a snubber for automobiles. After some work with E.R. Squibb Co., Jack went to work with Curtis Wright—his boss being our own classmate, **Ted Wright**. The depression wrecked his plans as it did for most of us.

Jack became interested in the magnetic compass; in fact, he was one of its early inventors. The post-depression years saw the slow and difficult development of the principle of the magnetic compass into a practical and commercially accepted device. Just before World War II, Bendix Corp. became interested in Jack's equipment, but the war postponed all development. In the meantime Jack became Chief Investigator—New England, for the Compliance Department of the War Production Board—all of this being interesting, rewarding, and full-time employment. With the war over, Jack's patents for the magnetic compass enabled him to make the Sperry Corp. the licensee for the use of the flux valve for

airplanes. It is used in nearly every air ship in the world.

Since 1948, Jack has been in a position to participate in many communal activities, which challenge he has accepted and met in full measure. In particular, he has served as Chairman of the Cambridge Chapter of the American Red Cross. He reports that M.I.T. has more than met its quota. Jack is particularly analytical about group behavior, especially in his work with the Red Cross. What is it that makes groups, like M.I.T., respond to the Red Cross blood bank? He believes it is something akin to religion, a feeling of belonging, an identification, and even a small amount of ritual and regalia. All very interesting.

While Jack and his wife were talking to me, a telephone call came from his family concerning his grandson who is now at Bethesda Hospital near Washington. He was wounded in Vietnam in June and has been on the danger list for the past four months. The report was that he gained three pounds in the past few days, the first encouraging sign. The prayers of all of us go to Jack and his family that his grandson has a speedy recovery to normal health.

Here is a welcome note from **Herbert McNary** whose life story has an unusual slant (as many of ours have as M.I.T. graduates.)

"Marion and I found it most enjoyable meeting the Max Seltzers, Julie Howes and others at this year's Homecoming after it took us the 50th anniversary to rediscover what has only been not more than 10 miles from my home in Boston. I guess I left a proper reflection of M.I.T. to my son Jack, Class of '54, who went on to be a Ph.D. and dedicated research scientist and who at age 35 became President of the American College in France. My own experience seemed so far-out compared to the 'lives' you record so interestingly that when I dropped names like Ann Corio and James Michael Curley it was hard to take seriously your wishing to set this varied 52 years since 1918 down on paper. Then you called. The influence of relatives might be an explanation. My father had been an actor for years and my boyhood was enlivened by frequent actor guests at home and backstage visits and the smell of greasepaint which I was to smell again when I became Boston's City Censor in the Thirties.

"A brother of my mother's died in his twenties after having broken scholastic records as a teenager at Boston Latin, Harvard and Harvard Law. As a result I went to Boston Latin, aimed for Harvard, took Harvard exams and then switched to M.I.T. Just why I still don't know. Let's skip to World War I. After some physical rejection disappointments, especially for aviation, I enlisted, remained state-side and like Napoleon and Hitler rose to the rank of corporal. Coming out in mid-1919, a political connection got me a job on a construction

project with long hours but little to do. I challenged the propriety of an English play *Charlie's Aunt*, being planned for St. Patrick's Day in my native South Boston and was in turn challenged to come up with an Irish play. And so with time on my hands and a typewriter available I wrote a play, *The Lephrechaun*, which would never win awards but was played by amateur groups for many years.

"Having done that I entered a national short story contest and won second prize. I was really bitten. I became a free lance writer relying on quantity rather than quality but encouraged enough by editors to lead an existence that permitted extensive travel and activities in social, civic and political and even veteran affairs. Then came the depression and a family that wanted a guaranteed income. Mayor Mansfield made me City Censor for Boston. . . . So an M.I.T. man became a regular official visitor to the Old Howard. When World War II came I reverted to some of my M.I.T. courses and joined the U.S. Department of Labor and later the VA in safety work. I forgot to mention that between shows at the Old Howard I studied law and twenty years after M.I.T. became an attorney. I resurrected a program for fire prevention education born of necessity back at Camp Devens in World War I. I became so enamored over the idea of its being a sustained elementary school program that I convinced the Boston Board of Fire Underwriters to sponsor what I now called The Fire Marshal Plan, along with my being the Board's Executive Manager and Legislative Counsel.

"My writing has been pretty much limited to being for many years a feature and editorial writer for the *Insurance Advocate*, and if you have been involved in insurance you know how controversial has been the business. Again, it has been a far-out life for M.I.T., but has had its moments. In June Brenda—like Joan, Jack and Pat before her—won a college degree. In August she got married, and there was a gathering of the clan from as far away as France and California including seven grandchildren; and so with that and still working and active and knowing that there are Max Seltzers in this world 52 years from 1918 makes matters far more pleasant than what today's news tells us, and encourages belief [that] the M.I.T. classes of the 2020's will have as pleasant memories as those of a disruptive 1918. Let's wait and see."

The weekend of October 3 and 4, the Howes and Seltzers drove to Paris Hill, Maine, to visit the **Ed Rossmans**. We had not seen them since the 50th reunion. During this time Ed has had some health problems. We are happy to report both Ed and Dorothy are in fine fettle. They leave in three days for Tucson, Ariz., where they plan to stay until May and then return for the summer in Maine. It rained the first day so the three couples had a chance to have a most

enjoyable bull session on everything from M.I.T. to the world. It was a most pleasant weekend. It is a great pity we do not have more visits with other members of the Class.

**Mal Baber** sent a post card from Sintra, Portugal; it is so newsworthy I include its contents complete as follows: "My dear Max: We are here on our first stage of a modest hegira. Rome and London to follow. It is nice to be in a big city where you can walk the streets at night in safety. If you do not know this particular 'palace' [referring to pictured National Palace of Pena] it was supposed to be designed by Gustav Dore and is furnished in the most appalling Victorian style—a masterpiece of monstrosity. Regards to all." . . . Through our underground spy system, I am able to report that the **Sam Chamberlains** (from Marblehead) are spending a month in France.

I am indebted to **Clarence Fuller** for the following news-note concerning the **Harold Atwells**. "Dear Max: I expect that 50th wedding anniversaries are getting or will be getting quite commonplace among '18ers. But the enclosed by Harold Atwell might help you pry a story of his past and present activities. If I remember correctly, the basic cause of his 50th was on account of his being with chemical warfare at N.E.L.A. labs during W.W. I. I think he got burned with mustard or phosgene and was hospitalized. One of his nurses was an Ohio girl—Emma Crider. A young fellow named Cupid took over and the rest is history! His main work was with Texaco at their laboratories in Beacon, N.Y., that is apparently why the 50th celebration took them back to Beacon. Hope all goes well. Best regards, Clarence." Congratulations from all of us to the Atwells on their fiftieth. Also, Harold, I expect a story from you for these notes. . . . We have heard that **Bill Wyer** has retired from Wyer, Dick & Co.

We record with sorrow the death of **Ted Wright** on August 21, 1970. We were fortunate to have had him with us on our 50th, and to have had the opportunity then to renew the threads of friendship.

We also report that faithful classmate, **Ernest Grunsfeld** died suddenly on August 13, 1970, while vacationing in Tolloires, France.

**George Oxley** informs us that his wife, Alice, passed away in March.

Though I am writing these notes October 6, 1970, you will not be reading them until December—so here's wishing you all a Merry Christmas and Happy New Year.

About a year ago, I moved from 87 Ivy St., to 60 Longwood Ave., Brookline, Mass. 02146. As of now the Post Office does not forward mail marked for the old address, so please change your records and send your correspondence to me at my new address.—**Max Seltzer**, Secretary, 60 Longwood Ave., Brookline, Mass. 02146



# 20

**Frank Maconi** asked me to identify by name the classmates appearing in our reunion photograph taken in the garden during President Johnson's reception. Thanks to **Foster Doane**, I was able to accommodate "Mac" without difficulty. Experiencing some trouble in making out the faces in the photograph, Foster went to work and made out a numbered key and a listing of all classmates by numbers. Between us we were successful in identifying them all, correctly I believe unless we guessed wrong in one or two cases. Hence I shall be happy to have Xerox copies made of this key if any of you wish complete identification of those in the class picture.

Frank says, "**Al Fraser** and I tried to pick some faces and were only able to identify about 15 per cent—only one Bugbee and one Wason twin—so our batting average was lousy." Frank reports that he is still active as an investment advisor and is enjoying the work. He keeps very busy in Rotary activities, gardening and doing some renovating of his home in Framingham, but, says Frank, "my greatest pleasure derives from my Early American Country Store collection which contains many rare items and a large collection of early Edison phonograph records and record players. If any classmates become nostalgic for a trip into the past, I will be very glad to have them drop in for some real ol'time music." Let me remind you that Frank's address is 133 State St., Framingham, Mass.

A welcome card has been received from Switzerland containing the news that Betty and **Norrie Abbott** were there in August on a 16-day railroader's tour covering 28 different railroads, the crest of five mountains by cable, cog or tram, all sponsored by Swiss Air. Sounds like a perfectly marvelous junket and we can well imagine that those railroad buffs enjoyed it immensely.

Your secretary was much pleased to get a phone call from **Carl Leander** of Quincy, Mass. Carl, who has been in somewhat shaky health for some time, wanted to express regret that he was unable to attend the reunion and pleasure at receiving the reunion program with its listing of classmates. He wishes to be remembered to all his old friends. His address is 145 Whitwell St.

**Frank Hunt** stopped on his way from Florida to Maine—where he has a delightful summer place at Southport near Boothbay Harbor—to take in the 50th. Now, he is back in Fort Lauderdale at 1528 N.E. 16th Ave.

There are many in the Class who will be grieved to learn of the death of our popular classmate **Merrill Knox**, of 600 Edgewood Place, River Forest, Ill. Merrill had expressed interest in the reunion and had been active in the Chicago

area as district co-chairman. It is sad to report that his death occurred just prior to the reunion on June 7.—**Harold Bugbee**, Secretary, 21 Everell Rd., Winchester, Mass. 01890

# 21

Month by month we are fast approaching those jubilant days—now only six months hence—when, hopefully, all the members of the Class of '21 will return to campus to realize proud moments in celebrating with each other the golden anniversary of their sojourn at the then new Cambridge site of "Boston Tech." Wives and guests who accompany the sizeable group of classmates to our series of 50th Reunion events from June 3 through 7, 1971, will undoubtedly hear some wild and woolly tales of that kaleidoscopic quadrennium of undergraduate happenings. Of prime importance to us as a group is that, despite war, a minor depression, campus capers, confusion and other difficulties, there were happy days that also helped to cement strong personal bonds between members of the Class.

Subsequent admixtures of good and unfavorable conditions over the years have served to strengthen further the lasting affection of those who were affiliated with the Class in any way—undergraduate or graduate students, junior freshmen, the many who transferred into and out of the group, and others affected by the instability of our student period. With full realization of the necessity for program diversity and interest, Reunion Chairman **George A. Chutter** and his committee are striving to make this most memorable milestone a time for real enjoyment and celebration for everyone. Plan now so you and your wife will "Join '21 in 'Seventy-one!" Be sure to return the card George mailed to you last spring or write him a letter (address at end of these notes) and say that you and your wife are planning to attend. Only those who so indicate will be retained on the mailing list to receive further announcements and registration material. Act now!

## Administrative changes

It is with sincere regret that we record the retirement of Jim Killian, '26, as Chairman of the Corporation and express great joy over the elevation of President **Howard W. Johnson** as his successor to that office. Both moves are scheduled to happen July 1, 1971, right after our anniversary observance. We have had the honor and privilege of knowing Jim since he was our "boss" as Editor of *Technology Review*. All of us in the Class wish him well-deserved respite from the arduous tasks he has carried out so well during his years as President and then Chairman. We also extend to Howard, the most distinguished member of the Class of '21, hearty congratulations and a pledge of full Class support.

## Pre-reunion reunions

Because they were driving to Washing-

ton, D.C., from their home, 4015 Bayshore Blvd., Tampa, Fla. 33611, to attend the wedding of her nephew, Graciela and **Helier Rodríguez** decided to continue north for a reunion with Bertha and **Robert S. Cook** 326 East Lake Rd., Canandaigua, N.Y. 14424. Bob retired from the design and supervision of highway construction with the highway division of the New York State Department of Public Works. He and Bertha had visited Graciela and Helier at their home in Madrid on several occasions.

The Rodríguez couple then drove to Brielle for several days of most enjoyable reuniting, during which we were all invited to dinner at the golf club in Brielle by Alex and **Munnie Hawes**. Then we had a lawn cocktail party at the home of Maxine and your Secretary with a buffet dinner in Maxine's studio for our Florida visitors, Betty and **Sumner Hayward**, Dorothy and **Joe Wenick**, and Brielle neighbors Margaret and Dick Watts and Isabel and Jim McAfee. Several subsequent tours of the shore area afforded opportunities to catch up on personal news. Our visitors promised to be present for the 50th next June. . . . Maxine and your Secretary also enjoyed a visit from Helen Mosher, wife of the late **Harrison H. Mosher**, who has moved from Grand Rapids, Mich., to live with her two sisters in Bergenfield, N.J.

## Reunion Chairman reports

Concluding his report of summer activities of the 50th Reunion Committee, Chairman George A. Chutter says: "As of the end of August, 105 classmates and 86 wives have expressed their intention to come to the reunion. Cards of acceptance are still arriving and there are quite a large number of others, probably now on summer trips, who are expected to signify their intention to be with us. The committee is continuing to detail the plans for our celebration.

"Paul Rutherford and I have made visits to the Alumni Association offices in connection with these details. In August, another letter went out to the entire Class, emphasizing the necessity for returning the card enclosed with the previous (May) letter, or writing me a note as soon as possible, since future mailing will be based upon the list of those who say they plan to attend. The August letter also stressed the desirability for each member of the Class to write to six others whom he most wants to see in Cambridge next June. Special 50th anniversary Class stationery is available from me for this use.

"Also, the August letter enclosed a reprint of the May, 1970, *Fortune Magazine* article titled 'Come Squeeze or Bust, in Ho-Jo We Trust,' a revealing discussion of the principals and principles involved in the drama centered around M.I.T. I hope many will want to come back, not only to reminisce with old friends, but also to meet in person those involved in the drama and to see the huge M.I.T. of today on which it is staged. Kay and **Phil Nelles** called on Marion

and me and said they are eagerly looking forward to the 50th."

#### Reunion directory changes

Make these address changes in your '21 Directory to keep it up to date:

**Douglas W. Coe** is now captain, U.S. Navy, and a professor at the U.S. Naval Academy. He lives at 30 Wainwright Ave., Annapolis, Md. 21403 . . . **Laighton Evans**, who retired in 1965 as supervising coke oven engineer, Bethlehem Steel Co., says his home address is 1098 Locksley Court, Woodbury, N.J. 08096. He and Martha have a married son and daughter and seven grandsons. . . . The Reverend **William F. Hastings** retired in September, 1969, as pastor of the First Congregational Church, Athens, Mich. He and Ruth now make their home at 4736 W. Main St., R-2, Fredonia, N.Y. 14063. Along with the return of his personal data sheet, Bill sent a note: "I was with you only one year and then went back to Haverford, but I am grateful to M.I.T. and glad I had the engineering training which has been good for a preacher."

"The Institute helped me get through the year after the S.A.T.C. was disbanded. I worked in the library and got a room in Brookline for taking care of the furnace and shoveling the walks. Although officially retired, I am interim pastor of the First Congregational Church of Portland, N.Y., and have preached in my old pastorate at Ithaca, N.Y., and in Dunkirk." . . . **Ivan C. Lawrence**, former vice president for personnel administration of Minnesota Mining and Manufacturing Co., St. Paul, says he and Margaret have a new retirement address at 1 Ben Franklin Dr., Sarasota, Fla. 33577. The three Lawrence daughters are married and there are 10 grandchildren.

**Edward W. Noyes, Sr.**, and Kathryn have embarked on their semi-annual commuting trip from Thompson, Pa., to their winter abode at Pelican Cove, R.D. No. 2, Stuart, Fla. 33494. Kay and Ed have a married daughter, three married sons and 18 grandchildren. . . . **Charles E. Mendinhal**, partner in the Wilmington, Del., firm of Mendinhal and Lamb, Realtors and real estate appraisers, reports that he and Marguerite have moved their home to 1303 Delaware Ave., Wilmington,

Del. 19806. They have two grown children. Charlie is a director of the Delaware State Chamber of Commerce and director and secretary of the Central-Perpetual Savings and Loan Association. He is a member of the Elk River Yacht Club and treasurer of the Sons of the American Revolution.

Writing from his new home, 1974 David Dr., Escondido, Calif. 92025, **Harry M. Ramsay** says, in part: "I was taken aback to have such good notice in the July/August *Review* and herewith I complete a report on my whereabouts. Agnes and I think we have found the right place here at Escondido Country Club, a quiet community some three miles from the center of a town of 40,000 and only a half-hour from San Diego. The allergies previously reported were thankfully left behind. Glad to read in your notes about those I knew—Steffian, Payson, Spitz, Dubé, St. Laurent, Zoller, Barriger, Windisch—although it was so many years ago! I recently talked with **Paul L. Hanson**, Huntington Beach, Calif., who has moved to Phil Payson's area in Florida.

"He survived a most serious stroke four years ago. Despite this, he and Ruby have chosen to 'start over' in Florida because, he told me, he was lonesome for the many '21 and other M.I.T. friends who live there in retirement. We wish him well in such a big venture. I do not know his address but he can be reached through Marion and **Philip R. Payson**, 5031 Northampton Dr., Tanglewood, Fort Myers, Fla. 33901. I retired more than nine years ago. We play golf and have only minor physical problems at three score and ten! Come see us. Call 747-2626 and we'll come get you." The Ramsays are a long way from their three children and 10 grandchildren who live in Ohio and Michigan. We hope Phil Payson will send a note on Ruby and Paul with their address.

#### Mailbox medley

You now have a letter from Class President **Raymond A. St. Laurent**, 47 Gerard St., Manchester, Conn. 06040, which asks that you take action on several matters. Please do! Helen and Ray spent the summer at their home in Vinalhaven, Maine, with trips to the Lovell area and then to see Helen's folks in Nova Scotia

before a scheduled return to Manchester at the end of October. Ray's mobility is improving and he sounds grand on the phone. Write him a note. . . . One of two cards, mailed from the S.S. *Raffaello* the day she left Italy for New York, says: "Greetings. We are all fellow passengers." It is signed by Madeline and **Ralph M. Shaw, Jr.**, Course VI-A, and by Elisabeth and **Dugald C. Jackson, Jr.**, also Course VI-A.

Dug wrote the other card: "Following a tour of the Greek Islands, we took the Orient Express to Milan and drove to Genoa, where we ran into Madeline and Rufe Shaw at the Hotel Colombia Excelsior. None of us knew that the others were to return on the *Raffaello*. On board ship today, the chief steward assigned us to a table with two other 'merry couples,' as he pronounced it, and you can imagine our surprise to find Madeline and Rufe at the same table. Then the third couple joined us—would you believe—Annabelle and Joseph T. Lusignan, '24, Course VI-A, who were as surprised as we!" A good problem for the *Review* puzzle page: What are the probabilities of three Hexalphas being assigned to the same table on a voyage from Genoa to New York?

In this centennial year of the Missouri-Kansas-Texas Railroad Co., **John W. Barriger, 3rd.**, who has been president for more than five years, has relinquished the post at age 70 and is continuing as chairman of the road's executive committee to the end of this year. John was featured in "As I See It," *Forbes Magazine* for August 15, 1970, for his views on the Penn Central situation. In a gracious letter to your Secretary, John indicates he may perform some consulting services. . . . Further to last month's note on **John D. Bowman**, he retired in 1943 as special transportation engineer of the International Railway Co., Buffalo, N.Y., and is still carrying on professional engineering assignments. His memberships include the Engineering Society of Buffalo, the Buffalo Country Club, Kenmore Art Society and Buffalo Society of Artists. Mrs. Bowman is the former Kathleen Kenny of Buffalo. We've belatedly discovered that John won the varsity "T" for wrestling back in our student days.





J. W. Kendall, '21

S. Hayward, '21

#### Hews to the line

For his most helpful activity in secretarial duties, no words of commendation for Assistant Secretary **Sumner Hayward** can adequately express our full appreciation of his constant support of these columns. Nor should we forget the numerous contributions from Betty Hayward, sympathetic as she is to secretarial needs as a result of her own experience as secretary of Simmons Class of '23. Sumner, who retired in 1959 as engineer of outside plant and transmission of the New York Telephone Co., has a lengthy record of labors in the interest of M.I.T. and its alumni of all classes. A regular attender at functions of the M.I.T. Club of Northern New Jersey, he has served in numerous capacities for the club and was elected president for the 1958-59 season. In appreciation of what he has done for M.I.T., the club gave him signal honors in 1963 by awarding one of the first two silver bowls given to an "Outstanding Alumnus."

An Honorary Secretary of M.I.T. and member of the M.I.T. Educational Council, he reorganized the council in New Jersey and served as its chairman in connection with the admission of high school graduates to the Institute and related scholarship aid. He has been active in most of the fund-raising efforts preceding and including the Amity Fund, and was specially honored for his performance as a regional leader in the New Jersey-New York area. Local members of '21 know of his recent successes in arranging semi-annual Class luncheons and as a member of George Chutter's 50th Reunion Committee. Thanks for all of us, Betty and Sumner!

#### In Memoriam

It is with profound sorrow that we chronicle the loss of five of our number and extend sincere sympathy to their families.

**Jackson Warner Kendall**, of 401 Hermosa Pl., South Pasadena, Calif. 91030, died on July 23, 1970, in Auckland, N.Z., while he and Marjorie were on an extensive tour of the South Pacific. Born in Pasadena, Calif., on January 3, 1896, Jack came to M.I.T. in our junior year from Pasadena High School and Caltech, where he earned two letters in football

and was a member of Kappa Gamma. At the Institute, he was a member of the swimming team, Aero Society, president of the California Club, treasurer of Corporation XV and chairman of the auditing committee of Technology Athletic Club. In World War I, he was a second lieutenant, Coast Artillery Corps, and in the second World War he served as lieutenant colonel and chief of the maintenance division of the Headquarters Antiaircraft Command.

Jack had been treasurer of the B. O. Kendall real estate firm in Pasadena, vice president and owner-manager of Crown Transfer and Storage Co., and transportation engineer with the California Public Utilities Commission before starting an association of 33 years with Bekins Van and Storage Co., Los Angeles, in various managerial capacities, rising to vice president and assistant secretary. After semi-retirement in 1964, he returned to almost full-time activity, mostly in transportation cost and traffic studies in connection with I.C.C. and P.U.C. cases. He had received industry awards for his work. He was a past director of the Pasadena Tournament of Roses Association of which his father was twice president and in which he had been active since age 10.

He also was a past commander of an American Legion post and active as officer and member of many endeavors including industry societies; church, civic clubs and commissions; yachting, political and athletic clubs. He held the 1910 record California Tuna Club catch of a 145-pound tuna, taken in a one-hour and 37 minute battle. Surviving are his wife, the former Marjorie Harper McCutcheon of Greeley, Colo., two married sons, Jackson W. Kendall, Jr., Salt Lake City, University of Utah and Stanford, and Robert M. Kendall, Sunnyvale, Calif., Stanford and Sc.D., M.I.T. '59, having also been an instructor in chemical engineering at M.I.T.; and seven grandchildren. Marge has written a warm letter to be shared by Ray St. Laurent and your Secretary saying, in part: "Just before we left, Jack had passed the best physical he ever had. We had had nearly forty-five years together with real happiness and we were both looking forward so much to the 50th Reunion."

**Gordon Messinger Leland**, P.O. Box 124, Meriden, N.H. 03770, died on July 2, 1968. A native of Brookline, Mass., Gordon was associated with us in the freshman year. He had been an author in New York City and retired in 1955 as administrative assistant to the chairman of the New York State Commission on Housing. We occasionally heard of his activities through a mutual friend, Chauncey Grant.

**John Joseph MacNeil** died on June 8, 1968. Born in Grand Narrows, Nova Scotia, on July 25, 1896, Joe was one of three brothers who came to the Institute after receiving A.B. degrees from St. Francis Xavier's College, Antigonish, N.S. He was a member of the Catholic Club and was graduated with us in Course VI. He was a private in the S.A.T.C. at M.I.T. during World War I. Following association with the Cia. de Real del Monte, Pachuca, Hidalgo, Mexico, he joined the Mene Grande Oil Co., Maracaibo, Venezuela, S.A., and continued with the firm until his retirement about 1960, when he made his home in New York City. His brother, **Dan M. MacNeil** of our Class passed away in 1959 and he is survived by his brother, Neil MacNeil, '23, of 134 Nonotuck St., Holyoke, Mass. 01040. We are indebted to Neil's wife, Rhea, and to classmate Joseph C. Morrell for aid with these notes.

**Merle Halsey Davis**, retired brigadier general, U.S. Army, of Meredith Lodge, Franklin, Vt. 05457, died on November 30, 1967. His military service started in 1917 and he was associated with us in graduate studies in Course X in the senior year. He became captain and major, Ordnance Corps and, at the close of World War II, was a colonel and chief of the ammunition division, Office of the Chief of Ordnance, Washington. He received three awards of the Legion of Merit. He retired to Vermont after the war and became a consulting engineer and director of the Chamberlain Corp., Waterloo, Iowa.

**Palmer Wilbur Griffith**, of 43441 Acacia Ave., Hemet, Calif. 92343, died on July 27, 1967. Griff was born in Arlington, Vt., on September 4, 1898, and joined us in the junior year after receiving the A.B.

degree from Dartmouth in 1919. He was graduated with us in Course V and earned the master's degree at M.I.T. in the same course in 1922. He was a chemist with American Cyanamid Co. in plastics research at the company's New Jersey laboratories, where he developed melamine-formaldehyde resins and molding compounds. He was later transferred to sales engineering and technical services in the New York offices and then moved to Los Angeles to become West Coast technical services director, retiring in 1963. In 1952, he received the Hercules Powder Company's John Wesley Hyatt Award from the Society of the Plastics Industry for "achievement of wide importance to the plastics industry," with Dan A. Kimball, then Secretary of the Navy, giving the principal address.

#### Join '21 in 'Seventy-one!

If you haven't yet told George Chutter that you'll probably attend the festive 50th Reunion, don't fail to write him now. And when you send those welcome holiday greetings to your secretaries, please don't fail to return the data sheet attached to your Class Directory—it is urgently needed and will be a helpful gift for us. For a new yearend feeling of happiness and satisfaction, try sending a gift subscription of *Technology Review* to your town's library. We haven't often played "commercials" but our own pleasant experiences with the popularity of the *Review* at our local library and its appeal to such a wide age range of men and women—plus a lot of high school students—makes us want to share the idea with you. You'll find the rates in the front of the magazine. You'll get a year's worth of thanks from your library. The Season's Greetings to you and yours from all of your Class officers and committeemen.—**Carole A. Clarke**, Secretary, 608 Union Lane, Brielle, N.J. 08730; **Edwin T. Steffian**, Assistant Secretary, Steffian, Steffian and Bradley, Inc., 19 Temple Place, Boston, Mass. 02111; **Sumner Hayward**, Assistant Secretary, 224 Richards Road, Ridgewood, N.J. 07450; **George A. Chutter**, 50th Reunion Chairman, Box 305, Boulder Drive, East Dennis, Mass. 02641

## 22

Our president Parke Appel has been performing with his usual organizational talents by assembling at the Institute at least 32 classmates for a special open meeting on October 15 for discussions between members of our Class and the administration, faculty and students. The notice clearly presents the problems which need free and frank discussion. Participants for M.I.T. will include Jim Killian, Howard Johnson, Paul Gray, Ken Wadleigh, Al Hill, John Wulff, Dan Nyhart, Dick Sorenson, Bill Martin and Jerry Wiesner. Those classmates who have signified their intention to attend include Appel, Carpenter, Johnson, Mueser, Reynolds, Spoor, Warren Ferguson, Dandrow, West, Horovitz, Vilett, Chittick, Tonon and Chuck Brokaw. We hope that Bill Russell, Bill Elmer



*Chester W. Greening, '22, of Westport, Conn., participating in one of his favorite*

*retirement sports—fishing in the quiet waters of Long Island Sound.*

and others will also be there as a completely over-all point of view should be constructive in arriving at our personal conclusions. A full report next month.

We promised to tell you of Madeline and Parke Appel's trip to Hawaii. On the way out they were entertained by Janet and Tommy Thomson at Corona del Mar including a visit to Knott's Berry Farm and an evening at Victor Hugo's at Laguna Beach before joining their tour group. A few days were spent at the Hilo Bay Hotel while touring the Hawaii Volcano National Park to the slopes of Kilauea and the volcano fire pit. They enjoyed the tremendous banyan trees, the Japanese Park and the orchid and anthurium nurseries. After driving across the island of Hawaii, they had luncheon at Kailua then stopped at the Kona Inn. They took a short ride to the royal burial caves and to Captain James Cook's obelisk. From there they flew to the Maui Beach Hotel and covered that island on the sugar cane railroad. Then on to the Kauai Sands Hotel to see the grand canyon of the Pacific and to take a cruise up the Wailua River. From there they flew to Honolulu staying at the Village and going completely native. After spending six days in typical tourist fashion, day and night, they returned for a few days sightseeing in San Francisco and then back to Dover for a rest after 18 days of excitement and fun.

**Samuel I. Zack** was elected Vice Chairman of the Board, retaining the title of Senior Vice President of Gannett, Fleming, Corddry and Carpenter, Inc., Engineers, with headquarters in Harrisburg. The company has a staff of over 700 professional engineers, architects, planners and technicians, having expanded their engineering activities into every major field of civil engineering. **Fred C. Koch** founded Koch Industries, Inc., 45 years ago to build oil refineries. He was a Texas-born oil engineer of Dutch parents who shunned publicity and social affairs. After his death in 1967 his son Charles G. Koch, '57, took over and continued the business from the Wichita, Kansas headquarters. They are in all phases of the oil business including exploring, transportation, refining and marketing as well as the manufacture of chemical fibre glass products.

Lockheed Aircraft Corp. announced in August that **Horace W. McCurdy** had passed the age for normal retirement and elected "Mac" an honorary director available for consultation. He became a Lockheed director in 1959 when they acquired his firm, Puget Sound Bridge and Dredging Co. in Seattle. The name was subsequently changed to Lockheed Shipbuilding and Construction Co. . . . A most welcome and interesting letter has been received from **Chester W. Greening** of Westport, Conn. telling of his enjoyable retirement: "Alice and I spent the winter holidays in Akron, Los Angeles, San Diego and San Francisco, omitting Hawaii. Son, Tom, consults at U.C.L.A. in sensitivity training. We sat in on one of these sessions and wonder where we are going. It brings to mind a Hindu quotation, 'Man has learned to fly like a bird, swim like a fish, but he has not learned to walk like a man.'

"Thank you, Parke, for your invitation to a '22 Conference on October 15. Would that I had the wisdom to contribute to this Conference! Marg, our first grandchild was born in April. Do I have the youngest '22 grandchild a possible member of the class of 1991?

"I took time out from fishing and swimming in August for surgery and finished the season in fine shape. **C. Ford Blanchard** was in surgery in Virginia at the same time I was in Connecticut and we exchanged observations of the mini-skirted nurses! We had a delightful dinner visit with Marion and **Royal Stone** in New Fairfield, Conn., in late August. Royal recently retired from the Mossler Safe Co. in Norwalk and they will move to Clearwater in October. The political process, in which I am inexperienced, has intrigued me in connection with a petition I put through to construct a ¾ mile walk along the shore line road, starting at my corner. So in addition to the 'stein on the table' that awaits '22ers, I can suggest a scenic shore-line walk."

We were saddened to read of the death of **Myer Alpert** of Newton, Mass., in September. Myer founded Alpert Furniture of Jamaica Plain and Natick. He was also the founder and past president of the Stein Club and a vice president





Arthur W. Davenport, '23, Managing Editor for the Class' history.

and director of the Hebrew Immigration Aid Society. Myer was a Fellow of Brandeis University and a member of many professional and trade organizations.

The sympathy of our Class is also extended to the families of **Henry T. Slamin**, of Newton, Mass.; **John W. Kellar**, of Duxbury, Mass.; and **Raymon C. Buell**, of Sonoma, Calif.

Since admonitions are always available, the contributions toward our 50th reunion class gift now total \$599,000 for the Class. Let's not forget to keep those dollars rolling in so that we may, as usual, make a new M.I.T. record. Season's Greetings to you all—**Whitworth Ferguson**, Secretary, 333 Ellicott St., Buffalo, N.Y. 14203; **Oscar Horovitz**, Assistant Secretary, 45 Gerard St., Boston, Mass. 02119

## 23

The important news this month is that after delaying this announcement for some time we are finally obliged to tell you that **Howard F. Russell**, our Class President, is resigning his office effective December 31, 1970. Howard has been threatening to do this for well over a year but in spite of the protests of the remainder of the class officers and others, he is adamant and cannot be swayed from his decision. He has urgent personal reasons for making this decision, the least of which is that he feels that due to his remoteness in living in Arizona that he is no longer in touch with the affairs of the Institute. He has appointed Horatio Bond, Herb Hayden, Dave Skinner and myself to select an interim candidate to be voted on by letter ballot; he will fill in until our next reunion in 1973. Unfortunately our Vice President, **George Johnson**, is not in a position to take over at the moment, having undergone several major operations. George is resting more comfortably at home now and would welcome hearing from you (35 Brae Burn Rd., Auburndale, Mass.). Howard Russell has, over the past 25 years or more, been extremely active both in affairs of our Class and of the Institute. It is with regret that we are obliged to accede to his request.

**Dave Davenport** is well under way on his project—collecting material for "A Great History of the Great Class of 1923." We owe much to Dave for his generous offer to be Managing Editor of this production. His offer has been duly accepted by your Class President Howard Russell and is enthusiastically endorsed by your staff of class officers. You have all received his "form letter" asking for your own biographical records, and we sincerely trust that you will all send him the material concerning yourselves as soon as possible.

Dave has sent me some facts about his career and I think it is apropos to give you some of these in the hope that it will stimulate you to do likewise and really help Dave. Interestingly enough Dave started his career at the age of 15 operating a planer in a sawmill on the construction of the Tech buildings in Cambridge during the summer of 1916. He continued to work in the building trades during his summer vacations, graduating from the Boston Public School System in 1919 and four years later from M.I.T. in Course XIII with his bachelor's degree. Dave was associated with Stone and Webster for many years until his retirement in 1962. His main line of work has been construction administration, and in all he was engaged in some one half billion dollars worth of projects involving hydro and steam electric plants and high voltage transmission lines. He has also handled a large share of work involving economic surveys, reports and management work in many parts of the world outside of the U.S.A.

Dave has been active in M.I.T. Clubs in Virginia, and Brazil and has been most active in alumni affairs. There is so much to what he has done that we think it would be best to read it in full when it appears in the class history. So don't be bashful—there are many others of you who have much to contribute. **Forrest Lange** in a brief note urges all to contribute generously to Dave Davenport's great effort on the class history and gives your Class Secretary a good plug for this column.

We have a belated clipping from the *Springfield* (Mass.) *News* that **Earle A.**

**Griswold** was to have received an honorary degree from the American International College on June 6, last. Earle is retired executive vice president and one of the founders of Tampax, Inc., and is a trustee emeritus of A.I.C.; he served as chairman of A.I.C.'s Board of Trustees Building and Grounds Committee during the period when A.I.C. constructed 10 new buildings. Earle also served as vice president and director of Allen Laboratories and has been most active in many civic affairs.

We have news that **William J. Lutz**, chief engineer in the gas department of the Public Service Electric and Gas Co. (New Jersey), has retired after 47 years of service with that company. Graduating with our class in 1923, he has successively held the positions of assistant engineer of gas manufacture, assistant engineer and engineer of construction and chief engineer. He has been active in various technical societies, fraternal organizations and the New Jersey Gas Association.

Now from the *Wall Street Journal* we learn that **Alfred E. Perlman** has been named president of the Western Pacific Railroad after serving as vice chairman of the Penn Central Railroad. We wish you the best of luck Al. You are all too well known as one fine railroad executive.

We are delighted to see that our most able educator and friend **Julius A. Stratton** has been appointed by the M.I.T. Corporation to the "Committee on the Presidency" along with **Uncas A. Whitaker**. From the *Cornell Alumni News* we learn that Julius Stratton was Commencement speaker last June. We regret that the ceremonies were so rudely interrupted following his address. We marvel at the restraint and equanimity displayed by educators, administrators and well-renowned men of letters in the face of the unwarranted abuse by both campus and non-campus dissidents.

We are sorry to report the following deaths: **Manuel M. Delugach** passed away on February 10, 1970, at his home in Memphis, Tenn. He was a life director of the National Association of Home-builders and was active in both local and national affairs of that organization for many years. Also active in community and church affairs, at the time of his death Manuel was Honorary Treasurer of the B'nai B'rith Home and Hospital for the Aged. He was head of the firm of H. Delugach and Co., of Memphis, a firm founded by his father in 1908.

**Winthrop G. Dow** of Hilton Head Island, S.C. died on July 21, 1970. **Hugh S. Ferguson** of Barnstable, Mass., passed away on September 2, 1970. Hugh was a past president of the M.I.T. Alumni Association and in his business career was president of the Dewey and Almy Chemical Co., executive vice president of W. R. Grace Co., of New York and president of National Research Co. He

was a member of the Barnstable finance committee, vice president of the Barnstable Civic Association and a trustee of Cape Cod Hospital.

**Lawrence T. Haugen** of Annapolis, Md., passed away on July 25, 1970, and **Stuart P. MacDonald** died August 15, 1970, in Dunedin, Fla. Stuart, born in Derry, N.H., was a retired president and general manager of Fruit Gems Inc., of Dunedin.

We have the following address changes: Horatio L. Bond, P.O. Box 393, Hyannis Port, Mass., 02647; Dr. Edmund O. Cummings, P.O. Box 5102, High Point, N.C., 27207; Rodney M. Goetchius, P.O. Box 3026, Vero Beach, Fla., 32960; Edwin J. Heap, 2576 Clematis St., North Abington, Mass., 02351; Brigadier General Harrison Shaler, 380D Avenida Castilla, Laguna Hills, Calif., 92653; Herbert J. Stark, 200 Central Park South, New York, N.Y. 10019; Lloyd G. Taylor, 3546 Church Road, Ellicott City, Md., 21043; Norman L. Weiss, 2030 East Broadway #110, Tucson, Ariz., 85719—**Thomas E. Rounds**, Secretary-Treasurer, 4 Deer Hill Drive, Danbury, Conn. 06810

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We can now tell you that the **Adolph Santoses** did, indeed, include M.I.T. in their June itinerary. Dolph's old pal, **Ed Moll**, was the persuader, and after showing off his pride and joy, Sturbridge Village, plus a brief tour of scenic New Hampshire, he brought them to Cambridge for the Sunday festivities preceding Alumni Day. At the International Buffet that evening it was a real Course I reunion with **Johnny Fitch** and **Russ Ambach** joining them. Then they all went on to Pops. Dolph's wife is Austrian, and they were going on to Europe from here to see family and do a bit of sightseeing. When Ed asked how long they would be gone, he got a realistic answer, "\$3,000 worth."

This summer **Russ Ambach** played a round of golf with **George Glennie** in Andover, Mass. George is retired, but he finds plenty to do in the local historical association, of which he is a vice president. In the rear of the museum is a barn filled with old tools and equipment, and this is George's special interest. Maybe he could do a bit of Yankee trading with Ed Moll. Sturbridge Village has a marvelous collection of that sort of thing.

News of the month, (which is really the news of several months ago), is the marriage of **George Knight** and Mrs. Edith Clement, at that time resident supervisor of the New England Home for Little Wanderers in Boston. It happened away back on May 22, but it takes a long time for some news to get all the way out here to Lincoln. Mrs. Knight is British and they left shortly after to visit her daughter in England. George says that she has retired and that he had planned to do so, but now he has

put it off for another year. He has just been given a new assignment in product engineering and it is so intriguing that he will stay on with Elliott Business Machine that much longer. George must know that all of us wish them both the best of everything.

"When Puerto Rico's Governor **Luis A. Ferre** flies here April 14 for a quick Pan American Day visit, Cleveland will come face to face with one of the hemisphere's remarkable men." So begins a piece in the *Plain Dealer*. It goes on to give a packed schedule of luncheons, dinners, museum visits, and other things planned in Luis' honor. He was back here again in June to pick up a couple of honorary degrees, one from Amherst, and another from Harvard.

We probably reported this at the time, but if so we've forgotten about it. In 1958 the Atomic Energy Commission established a special award for "individuals who have made especially meritorious contributions to, or have been clearly outstanding in, the nuclear energy program," one award each year. A list of recipients to date has just been released, and it includes the name of **Hood Worthington** for 1964. What was new to me was Hood's ex-title at du Pont, "Director, Technical Division, Atomic Energy Division, E. I. du Pont de Nemours and Company." So now you know, too. . . . As of last June **Frank Shaw** also became a "former," Vice President, Sales, Rust Craft Greeting Cards. Now he can spend more time pushing his patented hot-log handlers. Last June also Frank was involved in another reunion, this time as chairman of the 50 Year Reunion Committee at Brookline (Mass.) High School. As far as we know the Shaws expect to stay put in Wellesley, but three other retirees have moved to other climes. **Dana Staples** and **Boynton (Curly) Fletcher** have gone to Florida, and **Hugh L. Walker** has gone from Hingham, Mass., up to Amherst, N.H. That's not much of a change of clime for Lefty, except insofar as he's improved his tax climate. **Ray Lehrer** says he can never retire, but at least he's making things a little easier for himself. After all these years of commuting to downtown Boston, he has moved to a Wellesley office, just a step from his West Newton home.

A year ago on December 13, 1969, **Richard C. Eaton** died in Hyannis, Mass. He had made his home there for many years. And last June **Morris A. Rabkin** died in Cherry Hill, N.J. There is no further information on either.

To end on a happier note, last October 11 your secretary and Mrs. Secretary attained their 40th marital milestone. It was a Sunday, and we were informed by our youngest that she had invited a few old friends in for coffee that morning. When assorted florist's men began to stand in line on Saturday to deliver pots and vases and baskets of flowers, and when a huge coffee urn appeared in the afternoon, that "few" became

suspect. Sure enough, all Sunday morning people drifted in and out, next door neighbors, long-time friends, and people we hadn't seen in thirty years. It was a memorable occasion, and one from which we had almost recovered by the end of that week. That's one of the advantages of our time of life, the lasting and valued friendships all of us have made through the years. . . . And on a still happier note for all of you: From your class officers, all our best for Christmas and the year ahead.—**Henry B. Kane**, Secretary, Box 177, Lincoln Center, Mass. 01773

## 25

Prior to the 45th reunion a questionnaire, "Grist for the Mill," was circulated and enough replies received to give a fair sampling of our activities. For those who did not attend the reunion I am furnishing a few of the high points. Sixty-eight per cent of us are now enjoying complete or semiretirement. The last includes those who still maintain some connection with their previous business commitments on a part-time basis. Travel was the predominate activity, but of real interest was the fact that many of us have been able to use our managerial or technical know-how in participating in community activities that require such experience. We appear to bridge the generation gap by interest in our grandchildren, we average 3.63 per alumnus.

After retirement as dean of Engineering at the University of Portland, **Thomas J. Killian** was appointed Visiting Professor of Applied Science at Portland State University. . . . In October, **Temple C. Patton** was selected to present the 1970 Mattiello Memorial Lecture at the meeting of the Federation of Societies for Paint Technology in Boston. Temple has been a prolific writer over the years he has been associated with the Baker Castor Oil Co. and the titanium division of the National Lead Co., as a technical consultant. This is the highest technical honor awarded a technical man in the paint industry. . . . At the 77th commencement of Clarkson College of Technology **Thomas R. Camp** was the recipient of the honorary degree of Doctor of Science. In presenting the degree Clarkson College expressed its pride in paying tribute for his lifelong efforts in the preservation of our natural environment. . . . **Jim Howard** comments in a note covering a visit to the Orient about the hospitality extended to him by (Kamy) **Masaru Kametani**. A letter from Kamy confirmed this including a description of the "tempura" dinner they enjoyed and a brief account of later evening activities.

Information received from **Julien J. Edgerly** indicates that after various business connections in electrical engineering he was called to active duty in the Navy in 1941. He retired as Captain in 1962, but continued as Technical Director of an ONR laboratory, Naval Civil Service, head of training at NSD Mechanicsburg laboratory. He became fully retired in





*Samuel Spiker, '25, Class Agent, Dr. F. L. Foster, '25, new Class President, and Garvin Drew, '25, Chairman of the Reunion Gift Committee (shown from left to right) at the Faculty Club where they met to plan the Class of 1925's 50th reunion program.*

1966. He comments that he has a son in Boston and a daughter in Sanford, Fla.

A meeting was held at the Faculty Club to initiate the development of plans for the five years culminating in our 50th reunion. The meeting was conducted by **Garvin** (Chink) **A. Drew**, Executive Vice President and 50th reunion gift chairman, with assists from **Sam Spiker**, Class Agent, and all others present: **Doc Foster**, **E. Willard Gardiner**, **Frederick W. Greer**, **Arthur O. Odegard**, and **Walter N. Westland**. As plans develop you will be kept informed by the various officers.

I am sorry to have to report the following deaths: **Harry Postal**, of Los Angeles, Calif., on January 25, 1969; and **William S. Bishop** of Westfield, N.J. on March 29. Thanks to the helping hand of your former Secretary and present President, Doc Foster, I am finally under way and wish all of you and your families the Seasons Greetings. Doc and Mrs. Foster took a summer trip to Europe and Doc has promised some comments for a later column. I am looking forward to being your Secretary and hope that you will keep me informed of any newsworthy items.—**E. Willard (Will) Gardiner**, Secretary, 53 Foster St., Cambridge, Mass.

## 26

As we pour over the clippings and memoranda from the Class, retirement continues to dominate and I presume it will for the next several years. So let's report a few of the messages. Here is a news release about **Bernie Morgan**. "M. Bernard Morgan, chief engineer for fiber operations, American Viscose Division, FMC Corporation, has retired after 41 years of service. A native of Cumberland, Md., Morgan currently resides in Philadelphia with his wife."

Jumping out to Patagonia Ariz.: "For a guy who once said every '26er should

send the secretary one note per year, I'm a bust! How about every 10 years from now on? . . . Quit international geological travel three years ago and now enjoy an Arizona ranch in the mountains 20 miles north of Mexico. I still have two kids in school . . . Good health, no worries and great fun making mineral displays for advertisers, call 'em 'Attention Grabbers.' **Bill Millar**." It is pretty clear that Bill is well organized in his retirement with the new geological activity so let's get back to a formal news release: "**Joel S. Tompkins**, chief power engineer for the Aluminum Company of America has retired after a 40-year career with the company. Mr. Tompkins began his career with the company in 1930 as an electrical engineer with an Alcoa subsidiary in North Carolina. . . . In 1962 Mr. Tompkins was appointed a Fellow in the American Institute of Electrical Engineers and cited for his outstanding 'contributions to the development of electrical transmission conductor and hydroelectric power plant design.'" The release also mentioned Joel's club and church affiliations, all in the Pittsburgh area, indicating he plans to remain there for now. Can't understand a born New Englander (Salem) not wanting to return.

"**Deke**" **Taylor** sums up his story on the back of an envelope thus: "Retirement for me is now complete with construction of a small winter house near the big summer place in Franconia, N.H. Expecting lots of grandchildren to visit us and would love to see any classmates who may be in the area."

Now for a change of pace let's move over to a classmate who doesn't agree with all this retirement business. **Pete Bellaschi** is still going strong with his consulting business to the power industry from his base in Portland, Oregon, and writes: "Dear George: During the past couple of years a key-word in your class reports has been 'retirement.' And here in the June report it pops up again, much to be expected . . . for time and tide waits for no man, as the saying goes. I got quite a chuckle from Chet Buckley's communication . . . he doesn't say a word on the issue, about his retirement. I may add that a small group of the Class of '26—still living—

don't have the problem yet. I happen to be one self-employed. Health permitting some of us in this small group will keep on going but as the years move along we'll have to do some coasting . . . following the swallows—south in the winter, north in the summer. And occasionally even now when the opportunity comes, we still put in a plug for M.I.T. I hope to be able to join in with the '26 classmates at the 45th reunion. With best regards, Peter L. Ballaschi."

There are many more retirement notes and we want to tell you about some of the recent honors bestowed upon **Jim Killian**, but Sunday's mail is now collected at noon so we must get this on its way. So with Season's Greetings from Pigeon Cove, we will defer these additional items until—yes—next year! Cheerio until then.—**George Warren Smith**, Secretary, P.O. Box 506, Pigeon Cove, Mass. 01966

## 27

Major General **Frederic E. Glantzberg** U.S.A.F. (Ret.) died July 1 in Kerrville, Texas. His home was at 930 Red Bud Lane. He is survived by his wife, Claire, and four children. We send to them the Class' condolences and feel that the Class has lost an outstanding member. Fritz was born in Springfield, Mass., attended Hill School and earned his bachelor's degree at Tech in mechanical engineering. He was a prominent member of the track team, specializing in hammer-throw and javelin, and a wearer of the "T"; he was in ROTC and a member of Scabbard and Blade. On graduation, he got his ROTC wings and commission, and, a year later, his regular army commission. During the 30 years that followed, Fritz and his family were stationed in virtually every part of the free world, and his responsibilities grew from year to year.

Before the war, it was Colombia and Panama. Called back to Washington in 1942, he was put in command of a B-24 bomber group and later sent to Italy. To use his words, he "flew the usual 50 missions". At the end of the war, back in the U.S., he organized the new developments division of the staff school of the Air University, and had assignments in Japan and Europe. Fritz' longest tour of duty was in Savannah, Ga., (1949-1952) though it was interrupted for some work abroad. When the Glantzbergs left for Albuquerque, there was a citizens' testimonial dinner and the mayor made it "Brigadier General Fritz Glantzberg Day." The new assignment meant atomic testing, which took him eventually to Eniwetok. Then, as major general, he took command of the 17th Air Force, with headquarters in Morocco and a territory extending east to India and Ceylon. The family was back in the states when Frederic III arrived in 1958, and retirement to Savannah came the following year, the move to Kerrville in '66.



L. Woollenden, '27      Royal Weller, '27

When I last saw Fritz, in 1957, his ribbons indicated the silver star, distinguished flying cross, air medal, two unit citations, recognition from the governments of Mexico and Colombia, amongst others. (He also deserves a medal for the Glantzberg Gazette, issued many Christmases, and for keeping in touch with us classmates as he toured the world.) We will remember him for the happy warrior he was.

Last month we wrote, all too briefly, of the award of the U.S. Atomic Energy Commission Citation to **George Darling**. Now, we have a copy of the presentation proceedings. From George's "words of appreciation", we learn that the Atomic Bomb Casualty Commission, which he heads, employs a bi-national group of more than 700 Japanese and Americans. In describing his work on the effects of the bomb he said: "We are trying to measure the effect of something new, that no one really understands. We are trying to learn whether this unknown shortens life through processes yet to be discovered. We seek to trace its impact on diseases which, though familiar, are still of unknown origin." He concluded by saying: "I am sincerely grateful for the opportunity Mrs. Darling and I have had to be a part of this tremendous effort. It has given a special meaning to our lives."

To keep the record straight: The pictures and names of **Les Woollenden** and **Royal Weller** were inadvertently exchanged in the October/November issue. Lest we be confused, they appear above in proper sequence. [Sorry gentlemen—Eds.]

**Luke Bannon** has written one of those newsy letters the class secretary dreams about and it is quoted here for the most part: "The August Review is at hand and the '27 notes provided some interesting reading. 'Dike' Arnold really gets around when he sets his mind to it. I was particularly shocked to read of the passing of Glenn Jackson. He always seemed to be one of those who would live forever—and he will in the minds of we who knew him. Then too there was the note of the passing of Russell McCassey, the guy with the perennial tennis racket. I also read of the death of Jack Wiebe. I hadn't heard of him since the old days of the 'Beavers.' What a ballplayer he was, and a general all around good guy.

"Here in the land of sunshine (?) we are still hanging our hats out and hopeful that, in passing, some of the boys may give a call or stop in for a visit. (Reservoir Lake, Sanford, Fla.) The orange grove is still producing even though the market for citrus has fallen in the past three years. One can readily see that the day of the small grower is rapidly waning. Soon nothing less than 10,000-tree outfits will be able to show a reasonable profit. At my age, though, I am not about to worry about that. I am thankful that both Louise and I are still navigating with reasonably good health. . . . We did not realize that you were so close, the many times we have stopped on the way north at Sailor Ed's in Mystic for a lobster salad. We also hope we will be forgiven by Jim Lyles and Ray Hibbert for not stopping in the Canaans." Thanks, Luke. Next year, start a little early.

**Warren Priest** has retired from Maseoneilan, Inc., of Norwood, after 36 years with that organization. He was sales manager for the petroleum and chemical industries. A photo in the *Norwood Register* shows Judas—as he certainly always called himself in the old days—looking very much as before with most of his hair and only a little bigger. . . . "Merchandise," which is the American Oil Company's dealer magazine, has a long article by **Bill Kaplan** about their forthcoming 91-octane lead-free gasoline. Bill has specialized in the technical aspects of automotive fuels and lubricants for American for many years and certainly is one of the most knowledgeable men in the country on the subject. . . . To all of his many well-earned honors, **Harold Edgerton** has added the Michelson Medal of the Franklin Institute. . . . **José Domingues** worked 43 years for IT&T in Latin America and has now retired. He has been in Santiago, Chile, for the past several years. He wrote with admirable happiness: "As I look back, I remember my M.I.T. days with tremendous affection and appreciation, and I have the same sentiments about my career with IT&T."

There are quite a few intercity moves to report—some probably due to retirement: Winthrop Puffer moved from Beverly, Mass., to Gulfport, Fla.; Yuk Lee from Cambridge to Belmont, Calif.; John R. Kelley from Newport Beach, Calif., to Santa Barbara, Calif.; John Gill from Wayland to Milford, Mass.; Francis Stubbings from Louisville, P.Q., to Tarpon Springs, Fla.; Reginald Jacobs from Belmont to Quincy, Mass.; William Engs from Rye, N.Y. to Chatham, Mass.; Herbert Houghton from Ventura, Calif., to Medford, Ore.; Paul Sackett, Melrose to West Falmouth, Mass.; and Frederick Kienle from Weymouth to Leominster, Mass.

Looking at the notes of December, 1945, (now Dr.) **Ervin Bramhall** had settled in Honolulu to start teaching physics at the University of Hawaii. His military tour had taken him all over the Pacific. He said he found an M.I.T. man "on every atoll."—**Joseph S. Harris**, Secretary,

Box 654, Masons Island, Mystic, Conn. 06355

## 28

As you read this issue the year-end will be upon us. May we then greet you with all best wishes for a happy holiday season and for a very good year ahead!

Occasionally some news will come to us by a circuitous route and so may appear late in these notes. We can only apologize for whatever such cause may have delayed the following two items. A clipping from the *Southwest Water Works Journal* of Temple, Texas for January, 1970 tells us that **Stewart H. Newland**, Sales Engineer, retired on January 1 after 29 years with Wallace & Tiernan, Inc. Stewart began his professional career as a consulting engineer in the power industry of New England. Prior to joining Wallace & Tiernan he spent six years in New Orleans, La., as a district engineer for the State Department of Health. According to the press item Stewart was planning to move to Shreveport, La., and there to continue in some sales and engineering work. His son had just opened a practice in dentistry at Shreveport at about that same time. . . . An announcement in the *Passenger Transport*, Washington, D.C., January 9, 1970 states that **Charles W. Ricker, Jr.**, was promoted to chief equipment engineer for Chicago Transit Authority. Previously he held positions with the Cleveland Railway Company and the Office of Defense Transportation. He joined the Chicago Surface lines in 1946 as a staff engineer, became chief specification engineer in 1952 and assistant chief equipment engineer in 1965. Chuck has been prominent in many professional and society activities that relate to his business.

We are very happy to report that **Dave Mathoff** has been making good progress since his two heart attacks late last year. He says the warm summer weather has helped a lot. Although still needing to be careful, Dave has returned to work on a reduced schedule. . . . Several years ago **Maury Beren** retired from his business then took up teaching mathematics as a second career. In a recent discussion with Maury he reaffirmed that this is a very satisfactory way of life for a retiree. He is teaching first and second year calculus at Lowell Technological Institute. The Berens have spent a month visiting in Greece and Israel. They agree with John Houppis that Greece is indeed quiet and well ordered under its present regime.

**Howard S. Root**, in a short note, refers to himself as "a drop-out with no protests." All drop-outs should be as deserving as he is! After a brave start in mechanical engineering (which proved not to agree with him) Howard entered the field of medicine. He studied at Harvard and at McGill University (M.D.), served in the army, then worked for 25 years as Pathologist at Montreal General



Hospital. He retired a few years ago and, as he puts it, "returned home to die—still waiting." Howdy, we all wish you a long and pleasant wait!

A group of your local (to Boston) classmates met for dinner at the Institute on October 13 then spent the evening on telephones promoting twenty-eight's participation in the Alumni Fund drive. Those taking part were: Maury Beren, Jim Donovan, Carney Goldberg, Dick Rubin, Walter Smith, Will Tibbetts and Abe Woolf. While we are on the subject, may we remind you to send in your own contribution or pledge promptly and gladden the heart of **Charlie Worthen**.

In a company news release we are informed that "**Ralph M. Evans**, inventor, author and long time contributor to the art and science of color film technology, has retired as director of Eastman Kodak Company's photographic technology division located at Kodak Park." Ralph joined Eastman in 1928 then left for six years, first with 20th Century Fox then with DeLuxe Laboratory in New York City doing research. He returned to Eastman in 1935 and has progressed ever since. His publications and patents are very extensive. . . . Ann and **Will Tibbetts** report that they have had a quiet and restful summer. At present they are concerned with marketing some summer cottages they have at a lake front in Tuftonboro, N.H., near Wolfeboro. Will has been in touch with **Louis Miller**, now retired. Lou underwent some surgery a few months ago but is all right now.

It was announced on September 1, 1970 that twenty-nine new Fellows would be honored at the Annual Meeting of the American Institute of Aeronautics and Astronautics in Houston, Texas on October 22. Included in the group is **Walter R. Ramsaur**, Consultant and Director, Garrett Corporation, for "his many contributions and long career in propulsion heat exchange and air conditioning." A.I.A.A. Fellows are persons of distinction in aeronautics and astronautics who have made notable and valuable contributions to the arts, sciences or technology of their field.

One year ago **Walter Hildick** moved up to chairman of the board at Curtis and Marble Machine Company, Worcester, Mass. His successor as president is Richard Harris, '48. Walter says he has no plans for retirement but he and Anne have done some traveling in Europe with visits to England, Ireland, Germany and France. They crossed the Atlantic on *Queen Elizabeth II* and were interested to learn that the ship is using many navigational aids, such as the satellites, which guide transoceanic plane flights.

With deep regret we must report the death of two classmates. **George E. Francis, Jr.**, known always as "Don" to his friends, died after a very long illness. His wife Trudy wrote: "Don went to Strong Memorial Hospital in Rochester, N.Y. in June. His sister and I brought him home to Bethesda Me-

morial Hospital on August 8th. He slipped quietly away from us on August 15th."

**Frank W. Horn** died on August 25, 1970. Frank had his own business from which he retired in 1956 to a life full of interests. He was active in various civic projects, served on his town Finance Committee (Barnstable, Mass.) for 18 years, and was an enthusiastic ham radio operator. When we talked with his wife, Emily, she said that Frank had been in good health and that his death was not anticipated. Their daughter Alice and family (two children) live in Rochester, N.Y.—**Walter J. Smith**, Secretary, 209 Waverly Street, Arlington, Mass. 02174

## 29

I regret to announce the death of **Nicholas Alexander**, Course II, Dean of the Holy Trinity Orthodox Seminary at Jordanville, N.Y. on April 25, 1970 at the age of 84. Dr. Alexander was born in Russia, a graduate of the Russian Naval Academy in St. Petersburg in 1906. He became an officer in the Russian Imperial Navy and continued his studies at the Michael Institute of Technology graduating from there in 1913 with a Doctor of Engineering degree and highest honors. When the revolution came, Dr. Alexander fled the country to North Africa, and became the Dean of Instruction at the Naval Academy in Bezerte from 1920 to 1925. Arriving in this country in 1926, he became an instructor at M.I.T. and received his mechanical engineering degree in 1929.

Dr. Alexander began teaching at the Rhode Island State College (now the University of Rhode Island) in 1932, as a professor of physics and aeronautical engineering. During World War II, he was a coordinator of civilian pilot training for the army and naval air corps as well as being active in rotary-wing helicopter development.

In 1946, he went to the Holy Trinity Monastery and was instrumental in founding the Holy Trinity Orthodox Seminary serving as its dean until his death. He leaves two stepdaughters and a grandson, Nicholas G. Markoff, '54.

I have received belated news of the passing of **Lloyd Dolge**, Course X, of Westport, Conn., on October 20, 1969. I have no further information.

A brief note comes from **Nicholas P. Stathis**, Course IV-A, of Washington, D.C., saying that he has been very active in the M.I.T. Club of Washington, D.C. since 1938, holding every office on the executive board including its presidency. "Last year, I retired from the board after 32 years of continuous membership but am continuing as a regular member."

**Thomas W. McCue**, Course XV, of Newton Highlands, Mass., writes that he is still actively involved in various business activities connected with New England National Steel. He is also doing some

export and import business with Taiwan and other countries.

**Robert G. Cowan**, Course XV, of Bernardsville, N.J., has retired as chairman of the board of directors and chief executive officer of the National Newark & Essex Bank. He joined the bank in 1938 as cashier. A director and president of the bank for 20 years before becoming chairman of the board in 1961, he is also a former director of the Federal Reserve Bank of New York. Mr. Cowan is a director of the Newark Museum, New Jersey state Chamber of Commerce, United Hospitals of Newark and the Junior Achievement of Essex-West Hudson, Inc. He is also vice chairman of the board and treasurer of Newark College of Engineering.

**Nathan E. Promisel**, Course XIV, of Washington, D.C., executive director, National Materials Advisory Board, National Academy of Sciences, has been designated vice president elect, 1970-1971, of the American Society of Metals. He will be installed as vice president at the annual meeting of the Society during the 1970 Metal Show and Materials Engineering Congress, October 19 to 22 in Cleveland.

Nathan's career started with research and development at the International Silver Co., from which he departed as assistant director of the laboratory to begin his own consulting business. He spent World War II with the navy department, retiring in 1966 as chief materials engineer and the materials exploratory development administrator. Nathan is a member of many technical organizations here and abroad and has served on their committees. A Fellow of the British Institution of Metallurgists, he is the recipient of various university, technical society and navy department awards and honorary lectureships. The author of more than 40 technical papers, co-author or editor of several books, he has lectured extensively in the U.S. and abroad.

**Virgil W. McDaniel**, Course XV, of Guilford, Conn., writes that he is vice president of Interchemical Corp., of New York. "After being with five companies in 10 years," he continues, "I have stayed with this one for 30 years. Have managed three different product divisions after some years as a chemical coating salesman. Am now on staff assignment for special problems." Virgil has lived in Detroit, Cincinnati, Toledo and Cleveland, as well as Short Hills, N.J. "Twelve moves for one company may not break any record, but it certainly is enough for one career." He concludes saying, "The variety of tasks undertaken have been most interesting and particularly invigorating and rewarding, especially when the results have been successful." Virgil attended our 40th reunion with his wife Betty; they have two children but no grandchildren yet.

I wish to take this opportunity to wish all of you a Merry Christmas and a

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Please accept my apologies for the delay in reporting our 40th reunion. The notice from the *Review* office concerning the due date for the notes vanished in the U.S. mails. The following notes were mailed to Cambridge on September 10, too late to make the October/November issue.

The 40th reunion was a resounding success, due in no small measure to the hard work and careful planning of our Reunion Chairman Jack Latham and his Committee which comprised Al and Grace Burling, Ernest and Henrietta (Johnson) Dane, Yicka Herbert, Joe and Alene Harrington, Ed Kingsley and George and Lue Wadsworth, as well as *ex officio* member Ruth Latham. Some 72 members of the Class attended with 55 being accompanied by their wives. In addition three children of classmates were present—Bob Schildknecht's two sons and Mary Lee Harris. Mary Lee, who was featured in the March '68 Notes as the youngest child of a classmate, is now four years old. . . . The festivities started with a cocktail party and buffet supper Friday evening, by which time well over half of the attendees had arrived. After supper we had the traditional showing of movies of prior reunions which Dick Wilson has accumulated over the years. These now comprise a double double feature length program and, of course, are still expanding.

The weatherman cooperated both Saturday and Sunday to provide bright sunny days that delighted our dwindling number of athletes and made life pleasant for those who elected to pursue less strenuous activities. The Wianno Club is a charming place to spend a weekend and an excellent location for a reunion.

At the business meeting after the banquet Saturday night the reports were mercifully brief. Greg Smith announced that by virtue of a substantial last-minute contribution our 40-year class gift to M.I.T. would be \$305,000. Class Officers elected for the next five years are: Greg Smith—President; Ralph Peters—Vice President; Ed Kingsley—Treasurer; Otto Zigler—Class Agent; and yours truly, Secretary.

The featured speaker was Dr. Jerome Wiesner who gave us a run-down on the handling of student unrest at M.I.T. As most of you know, the principal controversial issue was the nature of the relations between M.I.T. and the Draper and Lincoln Laboratories. M.I.T. adopted a technique that had not previously been used on other campuses, namely, getting a court injunction based on a threat of disorder, rather than waiting for a riot to occur. While this technique did not completely prevent unpleasant incidents, it worked well enough to make police intervention unnecessary.

The final event was a clambake Sunday noon which was held indoors because the terrain at the Wianno Club is such that a clambake for such a large group could not be handled out-of-doors. After the clambake most of the attendees left quite promptly because of rather tight scheduling Sunday evening. President Johnson had graciously invited us to a cocktail party at his home in Cambridge and thereafter many members planned to enjoy the buffet supper at the Student Center and attend "M.I.T. night at the Pops," a truly memorable event.

Turning now to a less pleasant topic, as a result of reunion mailings and oral reports, we have learned that three more of our classmates have passed away: **Mrs. Samuel McMurtrie** (Mary Chute) on January 3, 1969; **David Gurton** (date unknown); and **John Senter** on December 25, 1968. No details are at hand about Mary and David, but Win Hartford was kind enough to supply some information about John Senter. It seems that John died as a result of injuries received in a hold-up on Christmas Eve. He was a long-time member of the mountain Club of Maryland to which Win also belonged.

At the reunion Joe Harrington prepared, distributed, collected and analyzed a series of "Class Profiles" which I haven't yet had a chance to review. I will try to report on them next month. . . . Changes of address: James George, 300 Willington Dr., Silver Spring, Md. 20904; Alfredo G. Gutierrez, A. M. Muhlbach 14, 81 Garmisch-Partenkirchen, Germany; George A. C. Holt, Walloomac Tree Farm, R.F.D. #2—Box 15-W, Hoosick Falls, N.Y. 12090; Emilio N. MacKinney, Convento 8, Mexico 21 DF, Mexico; Myron T. Smith, Box 36—Cape Rd., So. Casco, Maine 04077—**Gordon K. Lister**, Secretary, 530 Fifth Avenue, New York, N.Y. 10036

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Don't forget to keep the dates open for our 40th class reunion. It will be held at the Bald Peak Colony Club in Meredith Village, N.H., from June 4—6—after which we will return to the campus for the remainder of the alumni festivities. (Note that the date has been changed from June 11—13 to June 4—6.) Let's make it the biggest turnout ever.

Colonel **Fred Elser** tells me that he is running for a director of the American Radio Relay League. Good luck, Fred.

Word has just been received that **F. C. Jelen**, who is professor of chemical engineering at Lamar State College of Technology, was given an Award of Merit for 1970 from the American Association of Cost Engineers and is also editor of a book titled *Cost and Optimization Engineering*, published by McGraw-Hill Book Co. . . . **Charles Broder**, who is the chief mechanical engineer at the Port of New York Authority, has been largely responsible for the new look at Newark Airport. When

completed, the construction program will provide the necessary facilities for larger aircraft and rapidly expanding air passenger volumes.

**Don Holden** recently retired as chairman of the board of directors of the Newport News Shipbuilding and Dry Dock Company and its Nuclear Service and Construction Company subsidiary. . . . **Earl Cullum**—another old radio ham—has been elected to the National Academy of Engineering. Congratulations, Earl. . . . A recent note tells of **Chuck Starr's** retirement in August 1969 as vice president and director of Esso Research & Engineering Co. Since then, he has been doing some traveling as well as consulting. . . . A recent release from M.I.T. reports that **Jim Fisk** was chairman of the "Committee on the Presidency" which was appointed by the Corporation to recommend candidates to the Corporation for the presidency and also to reassess the structure of the Office of the President.

Our deepest sympathy to the family of **Tom Grant**, who passed away on June 14, 1970.

Seasons greetings to all of you. Don't forget our reunion on June 4 to 6.—**Edwin S. Worden**, Secretary, 35 Minute Man Hill, Westport, Conn. 06880

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**Mrs. Helen (Moody) Traylor**, Course IX-B, continues to paint and show acrylic landscapes. We understand she uses a kinetic lighting technique to portray the light projection involved. Helen's husband is a development engineer. The Traylor's live at 3285 So. Newport St., Denver, Colo. . . . **Stanley Rudnick**, also Course IX-B, and also living in Denver at 250 Ivy St., is a wholesaler for a manufacturer of bar accessories, coasters, hot pads, etc. He still plays tennis regularly and has an enviable choice of trout fishing spots within two hours drive from his home. Stan has one son.

**Morris Spencer**, who took his master's degree in mechanical engineering with our Class is now retired in Dallas, Texas. Morris had a geophysical business for many years, drilled oil wells and developed commercial and industrial property. He flies to his ranch in Estes Park, Colo., frequently and engages in big game hunting. This year he bagged a polar bear near Spitzbergen, Norway. . . . **C. Milton Daniell**, who was in Course VI-C (communications) and was an active radio operator at WBET, Boston, at the time of his graduation, is presently with A. Earl Cullum Associates in Dallas, Texas. Earl, who heads the communications firm, is an M.I.T. graduate, Class of 1931. Milton has three children and four grandchildren.

**Donald Gilman** provides such an interesting description of the recent reunion in Spain that I include it in its entirety.



"During the week of June 20 to June 27, 1970, 23 classmates of 1932 and their wives converged on Madrid, Spain, for an unofficial 38th class reunion. Hosting this event was our Spanish classmate **Juan Serrallach** with his lovely wife Susanne.

Attending were Don and Phyllis Brookfield, John and Dorothy Finnerty, Nick and Barbara Flatley, Don and Doris Gilman, Fred and Susie Green, Ted and Mary Jones, Art and Rebecca Marshall, Ed and Polly McLaughlin, Rolf Morral, Harry and Maggie Moore, George and Emily Muller, Bunny and Eleanor Nealand, Bill and Midge Pearce, Bob and Lou Prescott, Russ and Sylvia Robinson, John and Hazel Robertson, Jim and Kay Smith, Manley and Savina St. Denis and their daughter Charie, Bob and Louise Strong, John and Helen Such, Lou and Ginnie Vassalotti, Carl and Philamina Wahlstrom, and Joe and Peg Welch. All arrived from vacationing elsewhere in Europe or departed for other trips afterwards.

"Juan and Susanne had ranged an extraordinary week for us, booking us at the Palace Hotel, and starting with dinner Saturday night at a typical fine Madrid restaurant with appropriately short speeches by class president Harry Moore, Bunny Nealand and Juan Serrallach. Sunday morning across the street to the Prado museum. Sunday noon by chartered bus to tour the Royal Palace. Sunday evening by chartered bus for a tour of the city, except for those who elected to attend the bullfights. Sunday night to dinner at the famous Corral de la Moreria where Lou Vassalotti distinguished himself on the stage with the flamenco dancers and a rendition of the Stein Song on stage by Bob Prescott, Joe Welch, Juan Serrallach and Manley St. Denis caused bewildered concern among the restaurant guests. Monday morning in the bus to Valle de los Caídos, the Valley of the Fallen, a tremendous memorial to the dead (on both sides) of the Spanish Civil War. On to a tour of El Escorial, the enormous combination palace-monastery built during the 20 years 1558-1598, and the architectural giant of the world at that time.

"Then to the lovely town of Segovia. Here in the town square under the arches of the high Roman aqueduct we were greeted by Candido himself, 'Mesonero Mayor de Castilla,' who turns out to be a personal friend of Juan. We were served countless kinds of hors d'oeuvres and wines from tables set up on the sidewalk while a band blared greetings to us from the third floor balcony. Then into a private room in Candido's restaurant where, after a welcoming speech by the Maestro, a fabulous dinner featuring roast suckling pigs. Candido gave us menus especially printed for the Class del 1932 Reunion especial en Espana and miniature wine pitchers. Juan gave us scones which he had had made up for his classmates denoting the occasion. Back to Madrid in time to get cleaned up for the late evening cocktail party given to us by Juan at his Royal Auto (golf

club. Here Susanne presented Spanish mantillas to each of the ladies and our class president, Harry Moore, presented to Juan a Paul Revere silver bowl and to Susanne a silver plate, both inscribed with expressions of gratitude from the classmates. The singing in the bus back to Madrid was pretty bad—the bus driver asked if 'Down by the Old Mill Stream' was our national anthem. Stopped en route for a short 2 a.m. tour of Juan's Madrid apartment. Early Tuesday, we went to Valencia in our chartered bus stopping for an extravagant paella lunch at the Parador Nacional 'Luis Vives.' Three days and four nights at the beachside Hotel Defin in Benidorm. Juan had ordered especially for us a bountiful menu of sea foods including enormous tender langostina. It turned out the hotel manager is a friend of Juan.

"Wednesday and Thursday nights our bus took us to Alicante to see the spectacular street displays, fireworks and bonfires honoring San Juan (!) Day while daytimes we were occupied at the beautiful sandy beach, at tennis, at the swimming pool, visiting Juan's beachside apartment, or the numerous bars—one afternoon a walking tour of the quaint old town of Benidorm.

"Thursday night after an especially fine dinner a 'business' meeting of the Class with speeches by nearly everyone including Rebecca, Eleanor and Polly. Friday night a wing-ding dinner and dancing party on the colorful outdoor patio of La Casserole night club featuring heroic dancing by George Muller, shirtless Don Brookfield and Manley St. Denis who ended up in the fountain. We all came away from Spain genuinely impressed with the tremendous strides which Juan showed us the Franco government is making towards modernization and development of Spain that we want to go back.

"We are greatly indebted to Bunny Nealand for his tireless efforts on this side of the Atlantic in getting us organized for this reunion, but we are most especially indebted to Juan and Susanne Serrallach for their generous hospitality and attentive arrangements in making our reunion in Spain so delightful." It appears that the rest of us really missed something.

I regret to report the death of **Rudolph Tietig, Jr.**, on July 10, 1970. Rudy grew up in the steel industry environment, took his degree in metallurgy and following graduation went to work in the Andrews Steel Co. plant in Kentucky operated by his grandfather. He became general superintendent in 1940 and in 1943 joined the U.S. Navy and was sent to the Mediterranean in charge of recovering strategic materials. He was discharged in 1946 and spent the first 11 postwar years with A. J. Boynton and Co. on a wide range of engineering projects. He joined Kaiser Engineers in 1957 and was principal engineer and staff consultant on planning and engineering steel plants until his death. Rudy was known

in most of the steel plants in the United States and had visited many in foreign countries. Rudy's forceful voice will be missed by many.—**Elwood W. Schafer**, Secretary, Room 13-2145, M.I.T., Cambridge, Mass. 02139; **James Harper**, Assistant Secretary, 2700 South Grant St., Arlington, Va. 22202

## 33

This issue is the last of the calendar year, and suggests that each of you sit right down and drop the Secretary a line, or two, maybe, making with individual news and holiday greetings, of course. Having been reminded, please accept my sincere wishes to you all for a Merry Christmas and a very, very happy New Year.

This time seems to be no different from many previous situations, in that news items are still, and probably always will be, scarce, though the volume is encouraging. So, I write this time of five or six of y'all, instead of many, many more, which is far more desirable. I have already made **Ed Atkinson** a promise to give him top billing in return for his two long letters. Curiously, on a given day I dropped Ed a line asking how to remove road salt from one of our wooden garage floors. And, as I dropped the note into the box, I turned and got our own mail. In it was a letter from Ed; I call it ESP. Inasmuch as Ed is a Doctor of Chemistry, I figured that he could solve the above problem in a scientific manner. He did, "Wash it with plain water as many times as the truck deposited salt." If that ain't science what is it? Ed begins his missive by acknowledging (one of the few who did) a card sent him from Mexico last March. Ed appreciates the info on the *Technology Review* setup which appeared in the September interim letter, but does not care particularly for the present format. Ed qualifies as an expert, as he was managing editor of the T.E.N. way back when. (Bill Huston was editor). Well, Ed, we just can't win em all. He is still a research chemist for Arthur D. Little, Inc., working on drug synthesis for the government, on projects all classified, though his four years on anti-malarial synthesis is not. This work is for the Walter Reed Army Institute of Research.

Now for the family: daughter Kathleen is in her second year of an M.A. program at the University of Massachusetts heading for the degree in education. She is director of residence for the seven middle floors of a 21-story dormitory (house mother to you). The dorm is still distaff, but will go co-ed soon. Carol, her younger sister is a sophomore at the same school; she lives in a co-ed dorm. Under these circumstances, I could'a slept in the Jackson dorm at Tufts, though I doubt that I could have stood it. Ed goes on to laud the patient taxpayers of Massachusetts for their generosity in providing facilities for 20,000 students at Amherst, and 4,000 in Boston. He says that other state schools have grown ac-

cordingly. He does not mention the cost of providing such facilities, and what percentage really belong in college.

Here's one for the opposition. "I am strongly in favor of the one-day Alumni (Homecoming), as two days appear to him to be too much for us old timers." Here again, Ed does not consider how many M.I.T. Alumni are not old timers at all. In a separate letter, Ed belatedly tells us about his lovely Lorraine, his good wife for all these years. It seems that Lorraine stays closer to her Alma Mater than does Ed. She is Class Agent for her class at the Yale University School of Music. The Atkinsons recently attended the annual meeting of the Yale Alumni Fund in New York City, and Lorraine was so inspired as to go out and double her collections. Good for Lorraine! To Ed, this may not be the first time I have had your family biography, but it sure appears to be the best one. Many many thanks. Your classmates will appreciate hearing from you.

From another seldom heard from source we get a fine family and vocational biography; that of **John T. MacIsaac, Jr.**, a naval architect of note, it seems. John has a unique story. He had a change of address without moving his home, which goes to show that M.I.T. men can do about anything. It seems that John is in an area where the Post Office Department, with their own good reasons, decided to effect some economies and to better the service by combining three towns into one new district—and created a new town, Eden, N.C. John has had a rather varied career, to wit: three years after 1933 with the United Fruit Co., at sea obtaining his engineer's license and experience; four years teaching at Hill School, Pottstown, Pa., (not to be confused with Chambersburg); one and one-half years at M.I.T. teaching naval architecture; during W.W. II he joined the Kaiser firm, as naval architect and chief engineer at their Richmond yard. This job lasted only one year; he then joined George G. Sharp, Naval Architects and Engineers (Marine), as their west coast manager; at war's end, he had a brief fling in the aluminum awning business.

John then joined Fieldcrest Mills in Spray, N.C. (now Eden, N.C.). This move has a familiar note—he was selected to be one of their engineers because he was familiar with mechanical design but knew nothing at all about textile machinery. Fieldcrest wanted a fresh approach, and in John, they got it. He has been with them 25 years and is now their director of mechanical development, designing and building textile machinery of a special nature, and he has accumulated more than 20 patents with more pending. Now, here comes one more instance of real sensible use of top manpower, John works only eight months per year, and he and "Ma" do many of the things they always have wished to, recreation wise, but could not on account of their rearing four children. John, I think that this 8 and 4 is smart not only on your part, but also your company's.

You will live longer, and be far more valuable to all.

Now the children: "Jean and I were married in 1936 and have had four children, two girls and twin boys. The older of the two girls went to Duke for two and one-half years, then got married and is now busy bringing up five grandchildren." Golly! The younger of the girls graduated from Oberlin, *cum laude*, studied further at the University of Hawaii, and the University of Alaska, is an oceanographer, and is married to one of same. Both work at the University of Washington, Seattle, as oceanographers. No grandchildren here, John? The twins, now 24, have had a few problems at school, inasmuch as "they are as lazy as the old man. John, the older, went to Chapel Hill for a year, quit and spent four years in the navy, then returned to school, and has one more year to go." John, I am with the boy! Just read over my biography if you ever get a chance. Charlie, the younger of the twins, took an engineering degree at North Carolina State, and is now in the air force, after receiving his wings in June, 1970. He was to leave (then) in a few weeks, for Vietnam.

The MacIsaacs have a place on the Outer Banks (NC), and they both enjoy the boating, fishing, and the rocking chair (see four-month vacation above). John says that though he has not been too good at attending reunions, he definitely will attend the 40th, two-plus years hence. Great stuff, John. Shall I make a reservation for you at Chatham Bars Inn? Further, John wishes me to mention his greetings to Fred Murphy, and Westy Westaway, two of his fraternity brothers. So mote it be! Thanks for the complimentary remarks, John. It does this old heart good to hear such. After so long a time your letter to me is one of the pleasant items in this otherwise drab (?) life. We all appreciate hearing from you and Jean, and, please ask Jean to join the ladies auxiliary and write me a card separately.

**Ferdinand Johnson** writes to bring me up to date on his address in Delmar, N.Y., and to close the gap a little. We hear from Ferd rather regularly, and see him oftener than most, so we are usually up to date, anyway. However he neglected, in June, to tell me that his daughter Leandra graduated from Wellesley about the time of our Alumni Day, so that he and the lovely Alice spent several weeks in and around Boston at that time. Ferd, send in the photo; there have been several blank spots that could use a photo, even yours. The *Review* readers can stand about anything, or so it appears. The little gal, Leandra, is now married to a 1968 M.I.T. young man. Also part of the two weeks, son Bram graduated from the Northeastern co-op course in June and is headed for two years at the Harvard Business School. Ferd, it seems, is still busy at the Albany Felt Co.; doing what? Heaven be praised: Alice runs a real estate office. Ferd deplores the fact that there is no M.I.T. Club in the Albany area (or Schenectady). Pete

Grant might read this and do something about it. If not, Ferd, you see Pete and start a club of your own. It takes but little if you tell the boys the right story, and plenty of you do not. Dang it all; if you really need it I'll help you myself. There just ain't enough clubs of ours!! Leona and I accept your good wishes, and I will surely make your story known to any classmates I happen to run into. Thanks a million for the nice letter.

Two cards have arrived from **Beau Whitton**, both unsolicited. One says, "Flash! Daphne and Beau have the cutest little granddaughter anyone ever saw; our first." Heck, Beau, they all are. Is there anything nicer than a granddaughter? Sure, two or three. No bragging, son, your part in the affair is but fractional, at best. But, I can understand your pride. Beau goes on to mention the interim letter. Thanks, Beau. It is work, but is also the labor of love. Say, fellas, here is another who can't wait for the 40th. But, then, my Beau is a regular for sure. That's why he is my foreign office man for the deep south. Beau's other card tells us that the Serrine Company of Greenville, S.C., has just been given a hundred million dollar contract by the Continental Can Company's Hedge, Louisiana, plant, for modernization and expansion. Our own **George Wrigley** is President and Chairman of the Board of Serrine (see the October-November issue of *Technology Review*). George is quite apparently doing a bang up job for his company and, of course, for himself and family. If achievement is worth anything, then this is it. I do wish that many more of our very successful men would send in their stories, but, modesty takes over, and in many cases is quite overwhelming; we lose by it. Again, George, our congratulations on the good job done and being done.

A card, again unsolicited, comes from **Warren Daniels**, from Angers, France. Warren says that he has been remiss in not sending us a few cards during his European trip and waiting until it was about over before so doing. Warren, we need and are delighted with cards and letters at any time, so there. He and Dorothy have been all over, as follows: where son Roger is working, at Angers, then the Black Forest, Bavaria, Swiss Alps, Italian lakes, the Riviera, the Pyrenees, Biarritz, thence back to Angers, where they did the Chateaux in the Loire Valley. After that they visited with Illinois friends in Paris, and spent a few days in London. Warren says that their annual trip to New England came late this year, but expect to do it earlier next time around. Yeah, Warren, do that, and take in Alumni Day (or two) so I can see you and not just read you. Warren adds that he is now a hydrologist in the water resources division of the U.S. Geological Survey. He was pleased to hear about Fozi Cahaly's new job with Spofford, Thorndike et al. He sends his best to Fozi and all of us. Thanks more than you will know, Warren. It is heartening to get such a complete story on one card. Why write letters if a card will do so well.



More of youse guys ought to try it for size.

Due to some unfortunate mixup in the press clip department, we just received a large mailing of clips late. Half of them were devoted to Athelstan Spilhaus, and, practically all of it has been covered here before now. Old Ath did participate in one ceremony not yet covered; he received an honorary degree from Hamilton College. I congratulate this remarkable man for the honors heaped upon him. No shrinking violet is Ath, and I love it. I hear indirectly that he is doing a top job as president of the American Association for the Advancement of Science, though that phase of this fellow's activities has not received too much publicity as yet. Attaboy, Ath; keep it up, and drop me a line when you have something to report on the A.A.A.S.

**George Vila**, President and Chairman of Uniroyal, Inc., has been named to the Sponsoring Committee for the Chemical Engineering Convocation at M.I.T. That's all that appeared in the press release that I got, so George, won't you help us out and send us some details? Remember, you never have yet so cut out the modesty and help me blow your horn. Your classmates and M.I.T. friends would sure love to hear something directly from you.

We carried a short one on **Clare Farr**, earlier, but did not receive an additional tid bit until too late for use earlier. Clare has been named the Corporate Historian for the MITRE Corporation, to continue the documentation started earlier by a consultant. Just as a review, Clare was with the Lincoln Labs before going with MITRE, and before that was with, successively, Dewey and Almy, the du Pont Company, and the Budd Manufacturing Company. Clare's work with MITRE is, apparently, mostly administrative.

Though almost too late, we cannot leave out a bit about **Morris Cohen**, President of the American Society for Metals, as reported here very early in the year. In March, he made an address to the Los Angeles Chapter of the A.S.M., "The Interplay of Metallurgy and Materials Science." Now here is why I just had to get Morris into the act, and I will quote, "Dr. Cohen is a former professor of Materials Science and Engineering at his Alma Mater, M.I.T." Now, Morris, what's this "former," I must ask? Just a line will fix me up for sure.

**John Wiley** makes the news again, late in August, as part of a very long article in the *New York Times* on the very obvious unspeakable congestion at Kennedy International Airport; road congestion, grossly inadequate parking facilities, etc. John is quoted as mentioning that the National Academy of Sciences, and the National Academy of Engineering, are making a joint, detailed study of proposed new, additional runway facilities on land to be filled adjacent to Kennedy. Here they run up against the environment business again; any new runway will

carry the noise still more into residential areas. I just can't quote this long and factual article. But, John, to you: It appears to this observer that for every airline passenger at Kennedy or any airport, there are two to four people meeting him or seeing him off. Try that one for size. This is, or appears to be, especially true on weekends. Is there anything in this? Well, it's nice to hear from or about Johnny. How about something direct some time, friend?

Well, Sir, I have seen **Emerson Norris** twice this summer; once he and Christine honored us by attending a rather large social (cocktail) get together at our house; an annual affair for our New Hampshire friends. Christine came aboard with the help of a cane. It appears that she was not looking and wound up with a bad foot. The other occasion was at the New England Center, at the University of New Hampshire, just recently, when another M.I.T. alumnus was honored with an award for public service or something. [The mystery "alumnus"—**Warren J. Henderson**; the "or something"—The Granite State Award; the citation—"Warren J. Henderson, retired business executive, cattleman, friend of agricultural education, and, the University of New Hampshire: Your interest in superior cattle breeding has, on many occasions extended far beyond mere personal consideration to the benefit of High School, young people, 4H youth, and the University. You have sought neither publicity nor recognition for your own sake but have brought wide attention to those special endeavors to which you have contributed an unusual dedication and capacity. Many have benefited from your generosity; New Hampshire is better because of your associations here. We are privileged to convey this Granite State Award to you for your outstanding public service. John W. McConnell, President, The University of New Hampshire."—Eds.] I am getting so that I am enjoying this Emmy much more than somewhat. I am even sending him a visitor occasionally. **Andy Regan** dropped in just a few days ago with his lovely not only to say hello, but to ask me and Leona to lunch, but also "doesn't Emmy Norris live around here?" I expect that the Regans were on the way to Maine, as the beautiful gal of his was born and raised in Portland. Unfortunately, I had to pass up the Regan lunch invite, as I had a previous commitment, and, I wasn't hungry enough anyway. Golly, how nice it is to have the fellas drop in, especially when they are old Course II addicts. Andy, I appreciate your sort of visit no end, but once a year is not often enough (see Florida address, below).

We have a few address changes, to wit: Raymond L. Brown, EE VI; Gustav N. Liljegren, ME II; John T. MacIsaac, NA XIII; Donald T. Newhall, ME II; Edna L. Perkins, VII; John Rollinson, WC; Francis T. Hall, EE VI; and Charles P. Woods, MG XV. These are available to all and sundry if and when the request is attached to a short biography or specific

news about the family, work, hobbies, etc. No replies without the family news!

Again, allow me to remind y'all that the 40th reunion is two-plus years away, and that the Institute gift chairman, **Ellis Littmann**, is hard at work, and then some, assembling the funds for the Big Gift. Our January column, and all after that, will contain a direct quote from Ellis. I am assured that the Class so far is doing well, as expected. Quite naturally, Ellis is working on his long list of prospective donors and may not yet have gotten to you; he will, however, and long before June 1973. Golly, fellas, I'd love to see this one reach, and pass, the record (see later). We have it, and perhaps we will prove that we do. Westy Westaway tells me that Jim Turner made a mistake in making him the 40th reunion chairman; he little knows that Jim made no mistake and has the 100 per cent backing of the class officers. No, Westy, you are in the clear; no mistakes have been made. Further, we wish you luck and much success. This column is available to you for direct quotes or any way you wish it. We implore you to make use of this facility. And, to the rest of you, write Westy and back him.—**Warren J. Henderson**, Secretary, Winter address: 1079 Hillsboro Beach, Pompano Beach, Fla. 33062

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In the notes of last month's issue I quoted an item from the *Simmons Review* about Agness and **Charlie Lucke**. Our *Review* had no more than made its way through the mails than I received the following from Agness: "Had I known the *Simmons Review* notes would appear in the *Technology Review*, I'd have added what would be of interest to you. Our charming hosts in London at both ends of our two weeks in Europe were Lee and **Eddie Chiswell**. We were impressed with the lack of soot and smog to the point where many of the famous buildings can now be cleaned on the outside and be expected to stay in their original color.

"We missed the beautiful gardens at Versailles but had the palace all to ourselves in a snowstorm; something which would not be possible during the tourist season. The lighting of the buildings in Paris is always beautiful but the addition of the white bulbs in the sycamore trees along the Champs Elysées for Christmas is a fairyland, especially with snow. The Königsalle in Düsseldorf is done the same way and the shops are more attractive than Paris—also more reasonable. Our daughter Jane was impressed.

"The Thanksgiving wedding was Eddie's son, Ted's. Having him in this area since a year ago July has been delightful. It also brought us visits from his beloved family, a plus on which we had counted. He and his bride live in Woodmont and we see them often. Eddie and Lee have now moved to 142 Route Gouvernmentale, Kreainen, Belgium.

"In July we went south for two weeks, spending a long Fourth weekend with our Bob and his wife at Fort Benning. The golf was a bit warm but we had a lovely time. The middle of August they left from here for Fort Bills. We always enjoy the mountains and stopped in Bowling Green on business. You must be happy to have the tourist season at an end. Friends who went to the Cape on vacation said the traffic was horrendous." (We are and it was.)

The Alumni Fund notes provide two brief items. From **Warren J. Kunz**: "Have seen **Wil Paulsen** recently. He just returned from a five-week trip to Norway. I'm still in engineering management (Acushnet Process Co., New Bedford) and do some traveling. Six grandchildren now. Son and son-in-law both M.I.T. with advanced degrees. . . . **Willard B. Simonds** writes: "With this utility (Florida Power Corp., St. Petersburg) 23 years. Now Fuel Manager handling procurement of oil, coal, gas, and related transportation services, also the various materials and services in all steps of nuclear fuel cycle."

In the July/August issue I asked for some help about **Dr. Frederick D. Drew** who died in July 1969. George Bull sent me information which arrived just too late for the last issue. Dr. Drew was a native of Cambridge who received an S.B. in biophysics from M.I.T. and then went on to take his master's degree at Harvard. He served on the faculty of Livingstone College, Salisbury, N.C., as professor of physics and dean of the college from 1939 to 1948. He then decided to enter the field of medicine and graduated from Howard University College of Medicine in 1952. He completed his residency at Freedman's Hospital in radiology. Dr. Drew joined the faculty of Howard in 1956 and served at the college and Freedman's until his death. George commented in sending this information, "I must admire him for going to medical school so late in life and it is a tragedy that he did not live longer to utilize all that knowledge." We extend belated condolences to his wife Ann and his two daughters and son.

I also have a brief item concerning the death of **John T. Odbert** who received his S.M. with us after taking his undergraduate work at Cornell. At the time of his death he was working at Picatinny Arsenal.

A news release from Dartmouth College announces the promotion of **Miles V. Hayes** to full professor. After receiving an A.B. from Yale, he came to M.I.T. for an S.B. in Course VI with our Class. He went on to Harvard where he received a master's degree in physics in 1947 and his doctorate in physics and engineering science in 1950. He had worked for Tide-water Associated Oil, Hughes Tool, United Aircraft and Jones and Lamson Machine Co., before joining the Dartmouth faculty in 1960.

**W. Franklin Baxter, Jr.**, has been ap-

pointed manager of engineering services for G&M Employment Service in Worcester. He has previously worked with the American Optical Co. and B. F. Marsh Co.

A final news item—**Eric J. Isbister** has returned to the Sperry Rand fold as marketing manager for planning and development of the Sperry Marine Systems Division in Charlottesville, Va. This, of course, means a move from Long Island to their new home, 2602 Huntington Rd., Charlottesville, Va., 22901. His older son, James Iain, is a junior at Juniata College while Eric Duneau, the number 2 son, entered W.P.I. this fall. He hopes to follow his father as a wrestler. To round out the younger generation, daughter Mora Jean is in high school.

These notes will reach you sometime before Christmas. May I wish you all a happy holiday and a good New Year.—**Robert M. Franklin**, Secretary, Satucket Rd., Brewster, Mass. 02631

## 35

If you have a brand new 5-year diary or are an advance planner, here is some information for you: the Institute calendar has been changed. This means reunions and Homecomings will be one week earlier in the future. Our 40th will be May 30, 31, June 1 and 2, 1975. With the new national holiday calendar, Memorial Day is celebrated the last Monday in May—May 26th in 1975. Hopefully this move will eliminate some of the conflicting dates with other college commencements.

For seven weeks in September and October our Class had all the advantages that accrue to the Class with a secretary retired from active business. I spent all but nine days recuperating at home from surgery for the removal of a kidney stone, with a gradually increasing number of hours back at the office each day. I was sorry to have to postpone a business trip on which I was scheduled to see Ham Dow and Gerry Rich in California and Sid Grazi and I. Hopefully Otto Zwanzig in Denver. Instead, I wrote to a number of our classmates and trust this will help to provide some interesting news for next month.

Each month the Alumni Association sends an envelope of address changes and news clippings to the cognizant secretary. One of the first address changes I received was for **Milton L. Weiss**, 500 Lowell Ave., Newtonville, the next street over from mine; so I phoned him. For almost seven years we have lived within 200 yards of each other. His daughter Claire and my oldest daughter Pamela are both juniors in Newton High having gone through junior high and some elementary school grades together. His son Bob is a Junior at Harvard. Milton joined Raytheon in 1950 and has been with them ever since doing technical writing and editing. He has been out-of-touch and we plan to get

together and rectify that. One classmate that Milton sees regularly is **Maurice Alexander** whom I had not seen since our Course VI classes. He lives in Newton only half a mile away. We had a long interesting chat on the phone. Maury joined G.E., Lynn, in 1946 and has been commuting from Newton for 18 years. He enjoys his work as a draftsman/designer of test equipment for jet engines. An associate in the department is Charles Marchetti, '34. Maury's older daughter Beth, 24, is working in a public health hospital in Newton. Younger daughter Judith, 22, graduated from Simmons last June and is now employed at Bell Telephone Labs. in New Jersey and "loves it." For the last 3 years Maury and his wife, with help from the Milton Weisses, have been spending most of their spare time and vacations fixing up a partially finished cottage they purchased in North Easthampton on the Cape.

'Thirty-fivers at the 1970 Homecoming included Rufus Applegarth, Jim Eng, Bill Abramowitz, Pete Grant, Bill Klehm, Bernie Nelson, Ed Taubman and Nelson Thorp with their wives, and Hal Everett and his son. . . . 'Thirty-fivers who worked on the 1970 Alumni Fund included Bill Abramowitz (also in charge of our 40th reunion gift), Leo Beckwith (our Class Agent), Joseph Kemper, Hal Bemis, Earle Megathlin and Don Wood.

On top of all his other activities and responsibilities, **Bill Abramowitz** has been elected a director of Moleculon Research Corp., Cambridge.

**John Taplin** is serving as West Division Vice Chairman in the Massachusetts Bay United Fund Campaign. John is Chairman of the Board of the Bellofram Corp., which he founded many years ago.

**Samuel Paul**, architect, of Jamaica, N.Y., has taken his son David into the firm as a full partner. David was in the M.I.T. class of 1960. . . . **William J. Bates** is director of administrative services for the U.S. Steel Corp., in Pittsburgh. Bill is a past president of the Steel Industry Systems Association and a past international president of the Association for Systems Management. . . . **John T. Howard** has been Head of the Department of Urban Studies and Planning at M.I.T. for the last 12 years. He is retiring from his administrative duties in order to devote full time to teaching responsibilities.

The 10th year of the Class Golf Tournament is now down to the final matches with **Dick Bailey** and **Al Johnson** meeting to decide the Championship. **Sid Grazi** and **Dexter Clough** play for the Consolation Flight. Neither Dick nor Al have won before so the President's Cup donated by Leo Beckwith 10 years ago will have a new name engraved on it and remain in circulation another year. [Prior to our press date word has come that the class champion for the year is Dick Bailey who won with a net 71 against Al Johnson's net 72.]



Here are some brief notes from classmates across the country: **Clyde K. Smith** writes from San Mateo, Calif.: "I visited M.I.T. last fall for the first time since 1935. It was a thrill to see so many familiar profs names still on office doors and to have a reminiscent visit with retiring Professor Tom Sherwood."

**Samuel J. Whitmore, Jr.**, writes from Santa Monica that health forced him to retire several years ago from his architectural business. . . . **Law Simon** also writes from California, "In my spare time am involved in a desperate lop-sided fight against millions \$ pushing the air-bag restraint. Mine is better, simpler, less costly—and unfunded!" The "air-bag restraint" refers to a method for reducing injuries in auto accidents. . . . **Robert A. Olsen** writes from State College, Pa., "In Mexico as Visiting Professor at Instituto Tecnológico Escuelas Superiores de Monterrey for 8 months (ending in August)—writing a book "Social Responsibilities and the Professional."

**George Morrisette** writes that he is still living in Louisville, Ky. (Art King please note) and is employed by the G.E. Appliance Division. . . . **Oliver Hoag** writes from Pennsauken, N.J., "Have just started as General Manager of Laugoner Aperture Cards, Inc., manufacturing data processing cards with a window of film for storage of drawings." Ollie and Lucile celebrated their 30th anniversary at about the time of our 35th last June. Ollie was very enthusiastic about the new association and his future with it.

**Les Brooks** writes with some more information about **John J. Ryan** who died a year ago. "John was one of a group of about six whom I met the day I started at M.I.T. and got to know very well in the next four years. I also saw him a number of times when he worked in Buffalo and Chicago. I wrote to Mrs. Ryan who is now living in Hyannisport in a home they bought in 1968. She replied with a long letter giving me all the details of the rough time John had had the last two years."

Hanukkah, Christmas and New Years are just ahead as you read this. So with this column I am sending you all the Seasons Greetings. If you are one of those who produces a letter of your family's activities for the past year, would you please send me a copy, too. And if you do not, will you or your wife please drop me a note.—**Allan Q. Mowatt**, Secretary, 61 Beaumont Ave., Newtonville, Mass. 02160

## 36

Plans are well underway for our 35th reunion. The dates are June 4 to 6; the place, Jug End, South Egremont, Mass. (in the Berkshires). Do mark those dates on your calendar right now and plan a business trip to the area. **Henry McGrath** has agreed to serve as reunion chairman, and you will be hearing more directly before too long. . . . **Bob Newman**

writes from New York that he finds time for study of ancient Greek and Roman coins while managing General Electric's Corporate Planning Services, being an Associate Professor of Management at New York University, and maintaining membership on Manhattan College's Business School Board of Overseers. With his wife and son he has been "spending holidays amid various ancient and emerging cultures in an effort to understand better the human race."

**Wally Sylvester** writes that since 1964 he has been Vice President for Corporate Planning Services of Panta, Inc., in New York. The Sylvester family lives in West Caldwell, N.J. . . . **Tony Hittl** notes that after nearly three months away from the office it is hard to get back into the groove at the Linde Division of Union Carbide. His absence was the result of a round trip by boat to Europe, two weeks on a bus trip through Italy with 60 young people from the private school in Austria where his daughter Barbara is teaching, and several weeks in Austria and Switzerland. In Vienna he saw Betsy and **Elliott Robinson** and their son Clay, an army lieutenant stationed in Heidelberg.

The *Boston Globe* in late summer carried a feature article on the phenomenal growth of Compugraphic Corporation which was founded by **Bill Garth** and **Ellis Hanson**, '48, in 1961. Bill is the President of the firm which manufactures phototypesetting equipment. . . . **William Prudente** has been appointed a structural design engineer at the Headquarters office of Stone and Webster Engineering Corporation. He has been with the firm since 1951.

**Randal Robertson** writes that his retirement, reported in this column last May, was quite brief. He is Dean of the Research Division at Virginia Polytechnic Institute and State University (V.P.I.'s new name). The Robertsons have moved from Arlington, Va., to Blacksburg. Their biologist son, Hugh, is a post doctoral fellow at the Institute of Molecular Biology at Cambridge (England).

In the honors department: Springfield College conferred an honorary degree on **Chik-Suen Lam** as president of the Chinese Y.M.C.A. who has helped to make that organization a vital force in Southeast Asia. Hong Kong is his headquarters. . . . **Bill Hewlett** was named "Business Statesman of the Year" by the Harvard Business School Club of Northern California and **Walt MacAdam** was named "April Chapter Man of the Month" by the New York Chapter of the A.F.C.E.A. **Walt** is Vice President—Engineering of the New York Telephone Company.

I hope to see you all in June, but meanwhile do write!—**Alice H. Kimball**, Secretary, 100 Memorial Dr., Apt 8-6C, Cambridge, Mass. 02142 or P.O. Box 31, West Hartland, Conn. 06091

## 37

**Karl P. Goodwin** has been elected executive vice president of the Acushnet Company. Karl has been Vice President and General Manager of Acushnet's Rubber Division since 1955 and has more than 30 years' service with the company. He is: a resident of Fairhaven, Mass.; a trustee of St. Luke's Hospital and Southeastern Massachusetts University; and a director of the New Bedford Five Cents Savings Bank. . . . **Paul W. Allen** has been appointed senior vice president in charge of the mining group of Cypress Mines Corp. . . . **Richard H. Ewert**, President, Sewall Gear Manufacturing Co., St. Paul, Minn., has been elected senior vice president of the American Gear Manufacturers Association. He also serves on the Board of Trustees of Illinois College and is a member of American Society of Mechanical Engineers. . . . **James McCormack**, former Chairman and Chief Executive Officer of the Communications Satellite Corporation (COMSAT), has been elected to the Board of Trustees of the MITRE Corporation, Bedford, Mass.

**George O. Tapley** is secretary of the Sterling Housing Authority, Sterling, Mass. George has recently been honored for 27 years of perfect attendance at Rotary, and is an alumnus of Harvard after 4 years of public health graduate work. . . . **Bob Stone** has given up his education public relations practise on Long Island for full-time authoring in Hawaii. He has 4 books being published this year, including "The Emerging American Affluence Through Profit Sharing" (Prentice-Hall) and "Conduct Your Own Awareness Group" (New American Library). . . . Professor **Hjalmar D. Bruhn** participated in the 7th International Congress of Agricultural Engineering at Baden-Baden, Germany, where he presented a research paper on mechanical cherry harvesting. . . . **Robert F. Brown** is Unit Head, Mechanical Systems Engineering of Martin Marietta Corporation, Vandenberg Operations, Vandenberg AFB, California.

**Frank D. Lewis** is still serving on CCIR (International Radio Consultative Committee) Study Group VII on Standard Time and Frequency Broadcasting. He is also still on the I.E.E.E. Admission and Advancement Committee which takes him to New York every month or so. He has a daughter, Patricia, in Elmira College and a son Robert in Carnegie-Mellon University. . . . **Lewis P. Reitz, Jr.**, is Electronic Department Head, Technicolor, Hollywood. . . . **Joseph M. Puffer**, with his wife Celia, has recently completed a trip around the world. While in Turkey they visited their son who is a Captain in the U.S.A.F.; they also have a daughter teaching history at Medford High School and a second daughter in her senior year at Winchester High School. . . . **Norm Birch** also has been doing a lot of traveling as he is off to Europe about every three months, to Mexico in between and sometimes to

South Africa. Last year with his wife, Elvie, he took a trip around the world.

**Robert R. Wylie** is manager of illumination engineering, Sylvania Lighting Division. The Wylie's have moved to 100 Endicott St., Danvers, Mass. 01923. Their son Scott is architect R.I.S.D., University of Oregon, and their son Allen is a math instructor, U.S.A.F.A.; he is a graduate of U.S.A.F.A., with a master's from the University of North Carolina.

The officers of your Class send you and your family Seasons Greetings and with 1971 almost here, remind you once again of our 35th reunion in June 1972. **Phil Peters**, our class president, is already working on our 35th and has plans under way for an event not to be missed.—**Robert H. Thorson**, Secretary, 506 Riverside Ave., Medford, Mass. 02155; **Curtiss Powell**, Assistant Secretary, Rm. 5-325, M.I.T., Cambridge; **Jerome Salny**, Assistant Secretary, Egbert Hill, Morristown, N.J.

## 38

With the end of 1970 fast approaching, it is a good time for your secretary to clean out the class file and cover all of the accumulated goodies in this issue of class notes.

**Syd French** has been appointed assistant director, research & development, for Phelps Dodge Tube Co., South Brunswick, N.J., one of eight operating units of Phelps Dodge Industries, a subsidiary of Phelps Dodge Corp. Before joining Phelps Dodge, Syd was research manager of the Berylco Alloy Division of Kawecki Berylco Industries, Inc. for six years. Previously, from 1938 to 1963, he was employed by Bridgeport Brass Co., a division of National Distillers & Chemical Co. Syd's special area of study is the physical metallurgy of copper alloys. At Bridgeport Brass, he was responsible for the development of techniques for making special metal tubular products for use in nuclear applications.

The *Newark News* reported the engagement of **Arnie Kaulakis'** daughter Bernadette Marie to Paul Carr Settlemeyer of Short Hills. Miss Kaulakis, a graduate of Manhattanville College, is a marketing representative with IBM in Newark. Arnie is president of AIRCO-BOC Cryogenic Plants Corp., of London and Murray Hill. . . . **John C. Proctor** will become division administrator of the Strategic and Range Systems Division (D-05) of MITRE. John has been director of general services since 1967. Prior to this he served in other administrative management positions. Before joining MITRE, he was with Lincoln and the Digital Computer Labs at M.I.T. as well as the Bethlehem Steel Corp. . . . **Lloyd Bergeson** has been elected to fill a vacancy on the board of directors of Associated Industries of Massachusetts. Lloyd is vice president and general manager of General Dynamics' Quincy Shipbuilding Division, and served with

the Atomic Energy Commission before joining General Dynamics' Electric Boat Division in Groton, Conn., in 1951, where he coordinated design and construction activities leading to the first Polaris submarine.

Texaco, Inc., announced the appointment of **J. C. Williams** as general manager in the Refining Department. J. C. got his B. S. from Rice University and got his masters in chemical engineering with our Class. . . . The other day an airmail letter came in from Israel informing me that **Ben Epstein** has been appointed to a Professorship at the Technion—Israel Institute of Technology, Haifa, Israel. . . . **Wilbur Rice**, with his usual brashness, penned a note, which will probably be censored before it gets to print: "Don't let the minority groups run the Institute like they do at Cornell, etc." . . . A note from **Bill Preece**: "Small World Department: Bill Preece, Jr., and Ty Shen, son of **Tseng Y Shen** are currently sharing an apartment in Brighton, Mass." . . . **Gus Rossano** writes: "This is my seventh year at the University of Washington where I came to establish a graduate program of research and teaching in air resources. The program is growing by leaps and bounds! Have four children in college (one in graduate school). We all love the grandeur of the Pacific Northwest."

A very merry Christmas and a happy and prosperous New Year to all '38ers from your secretary.—**A. L. Bruneau, Jr.**, Hurdman and Cranstoun, Penney & Co., 140 Broadway, New York, N.Y. 10005

## 39

Season's Greetings, and some names in the national news: **Maurice F. Granville** was named president of Texaco Inc., New York City. He has been with the company for 31 years, most recently as vice president and assistant to the chairman of the board. . . . **Holden W. Withington**, general manager of the S.S.T. Division of Boeing, was widely reported in the press as giving Boeing's side of the controversial S.S.T. issue, prior to the projected Senate vote in mid-October on whether or not to approve additional funding for the supersonic transport.

Massachusetts' Governor **Francis W. Sargent** made national headlines when he approved the new State automobile insurance law intended to cut costs to auto owners. . . . **Robert C. Casselman** achieved additional coverage as chairman of the board of the Newton Community Development Corporation, recommending construction of 508 units of housing for low and moderate income families on 10 scattered sites in this wealthy suburb of Boston.

**Frederick A. Cooke** wrote: "I am completely absorbed with the task of getting a new company launched in the field of automated transportation systems. What with airports, urban applications, recreation, and bulk materials handling, the

opportunities appear virtually limitless. My home base is still Washington, D.C., but I spend a lot of time away, especially in California where the Dashaveyor Company is headquartered." . . . A brief note from **Joseph A. Neuendorffer** said that he had spent a year in Norfolk with Cinclantfit Headquarters and had now returned home to Alexandria, Virginia.

**F. L. Foster '25**, Director Emeritus, M.I.T.'s Division of Sponsored Research, very kindly sent along word about two '39ers from Course III, Mining, both of whom are doing very well in the Philippines: **Ramon S. Sevilla** was in the theater business in Manila. He is now engaged in farming and has a winery and a piggery as well. He planned to send his first order of Sevilla Fruit Wines to the U.S. in September. **Antonio W. Diokno** became the actuary for one of the big insurance companies in Manila. Later he formed his own company, Investment Managers, Inc., which is one of the leading investment firms in Manila.

Aaron M. White sent me this note concerning the death on September 25 of **Irving Cohen**, president of Lewis Chemical Company, Hyde Park: "Irving had been sick for some time. Many of us will miss his friendship and exceedingly good nature."—**Oswald Stewart**, Secretary, 3395 Green Meadow Circle, Bethlehem, Pa. 18017

## 40

**Herb Hollomon** has resigned as president of the University of Oklahoma, charging that there was political influence in the university affairs. In summarizing his reason for resigning, Herb said: "These threats to the integrity of this University and its members starkly represent the spirit of repression now running rampant without reason among us. We find ourselves facing the prospects of an environment not free and joyous but stifling—one in which the right to think and act according to personal conviction whether my own, the student's or the teacher's is denied if it questions conventional wisdom."

**Donald Stookey** received the American Chemical Society Award for Creative Invention for his work in glass-ceramics. Donald is the patentee of over 40 patents. . . . **Peter Leckie Ewing** has resigned as chief metallurgist of U.T.D. Corp. in Athol, Mass., and is now self-employed as a metallurgy consultant. . . . **Tom Jones** has been appointed to a Tech alumni advisory committee to re-examine the nature and goals of the Institute. . . . From **Ed Bernard** comes the note: "Appointed Manpower Administrator, Northeast Region Water Quality Administration, Department of the Interior, January 26, 1970. Retired from the U.S. Army Reserve June 20, 1970. Awarded the Army Commendation Medal, June 21, 1970." . . . **Ferdie Stern** notes that he was the recipient of the "Tatnall Award" from the Society of Experimental Stress Analysis. . . . **W. H. Krome George** has



been appointed president of the Aluminum Company of America.

This brief column is due to lack of correspondence. Remember, the column is what you make it. Please write your secretary. To each classmate a Merry Christmas and a healthy and successful New Year.—**Alvin Gutttag**, Secretary, Cushman, Darby & Cushman, 730-15th Street, N.W., Washington, D.C.

## 41

**Carl M. Mueller** has been appointed to the eight member "Committee on the Presidency" by the M.I.T. Corporation. The Committee's function is to recommend candidates to the Corporation for the presidency opening at M.I.T. and also to reassess the structure of the office of president at M.I.T.

**Rogers B. Finch** has recently been in the news for two important promotions. He has been promoted to the rank of brigadier general in the United States Army Reserve. He has also been promoted to the position of vice president of planning at Rensselaer Polytechnic Institute. At R.P.I., Rog has held positions of increasing importance since joining Rensselaer's staff in 1954 as assistant director of the research division. He was associate dean of the School of Science, then director of the research division, associate director of R.P.I.'s Hartford (Conn.) Graduate Center and director of academic planning before being named director of planning (office of the President) in 1969. In addition he served from 1961 to 1963 as director of university relations with the Peace Corps. In his present position he is responsible for coordination of the university's long range planning programs. Rog's nomination to one-star status in the military reserve occurred on July 24, twenty-nine years to the day that he was commissioned a second lieutenant in the Quartermaster Corps in 1941. Promotion to the rank of general requires Presidential nomination and Senate confirmation. Following active duty with the Quartermaster Corps as a training officer during the early years of World War II, he served as director of heavy textile research and development. He has completed reserve officers programs at the Quartermaster School, the Industrial College of the Armed Forces, the U.S. Army Command and General Staff College, and the Army Logistics Management Center, has served with reserve training units in the Albany, Boston, and Washington areas, and was assigned to the Army Research Office. Last November he was assigned responsibility with the Army Materiel Command where he would serve actively in case of national mobilization.

**Howard O. McMahon**, President of Arthur D. Little Inc., Cambridge, Mass., has been elected a Director of the American Society for Testing and Materials for a three-year term beginning June 26, 1970. Howard is a native of Killiam,

Alberta, Canada, and a naturalized American citizen. He received his B.A. and M.A. degrees from the University of British Columbia at Vancouver in 1935 and 1937 respectively, and his Ph.D. from M.I.T. He was a research associate at M.I.T. for several years prior to joining Arthur D. Little in 1943 where he was instrumental in developing, with others, the Collins-ADL Helium Cryostat, which has become the standard method throughout the world for liquefying helium for low temperature research. For this work he was awarded the Edward Longstreth Medal in 1951 from the Franklin Institute. He is a member of the American Association for the Advancement of Science, the American Academy of Arts and Sciences, the American Chemical Society, and the American Physical Society.

**Herbert R. Moody** has been named assistant general manager of Micromedic Systems, Inc., Philadelphia, Pa., manufacturer of microanalytical instrumentation. Before his appointment, Herb was assistant plant manager of the Houston plant of Rohm and Haas Company. . . . **Calvin D. MacCracken** won the National Senior's Squash Championship for 1970. He also won the Eastern Senior Tennis Doubles Championship. . . . **Joseph G. Gavin, Jr.**, was elected a Fellow of the American Institute of Aeronautics and Astronautics for his "unique pioneering work in the design and successful development of the lunar module." . . . **Charles W. Wyckoff** is a co-author of an article "Eclipse Photograph With a New Color Film" appearing in the August, 1970 issue of *Sky and Telescope* magazine.

**Alfred B. Booth** has been elected vice president—management services at Warnaco, Inc., in which position he will be responsible for the supervision of the corporate manufacturing, systems planning and engineering departments. He was formerly assistant director of the product operations staff in the office of the president of International Telephone and Telegraph Company in New York. From 1963-68, he was associated with the Celanese Corp. as corporate director of manufacturing, where he instituted and directed a cost improvement program similar to that proposed by Warnaco. . . . **Edward V. Hardway**, with two associates, has formed a new corporation "Spearhead Technology Corp." of which he will serve as president. The new firm will be devoted to the development of high technology products in the electronic and electromechanical areas. It is located in Clarewood, Texas. Ed formerly founded the Houston Instrument Corp., of which he was president and which is now a division of Bausch & Lomb.

**William T. Butt** has been appointed a National Director for the Associated General Contractors of America which is based in Washington, D.C. Bill is president of the West Central Ohio Chapter of Associated General Contractors of America. He is also president of Timmons, Butt & Head, Inc., which has

offices in Dayton and Columbus, Ohio and has currently under contract the \$15 million Avionics Science Laboratory at Wright Patterson Air Force Base. He is past president of the Associated Contractors of Ohio, the Dayton Builders Exchange and the Dayton Area Construction Industry Association and resides at 4501 Southern Boulevard in Dayton.

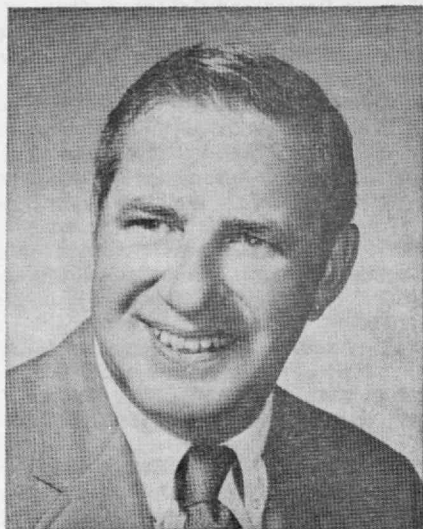
**Robert L. Sinsheimer** was elected to a three-year term in the Council of the National Academy of Sciences, the body responsible for general direction of the academy and the National Research Council. Robert is professor and chairman of the Division of Biology, California Institute of Technology.

**Harry C. Rodin**, Captain, U.S.N., was retired from the Navy on July 31. He was awarded the Navy's Meritorious Service Medal at his retirement ceremony. He had been project officer of the Special Communications Project Office. He came to the Command in 1966 as one of the organization's founders. He helped organize NAVELEX into one of the Naval Materiel Command's Systems Commands, and most recently he managed 17 special communications efforts in support of the Fleet Ballistic Missile Program. He is married to the former Miss Jean H. Kidwiler, Seattle, Wash., and has two children, Sally Ann, 22, and Christine Mary, 18. Falls Church, Va., is his home in retirement.—**Walter J. Kreske**, Secretary, 53 State St., Boston, Mass. 02109; **Everett R. Ackerson**, Assistant Secretary, 831 Cranford Ave., Westfield, N.J.; **Michael Driscoll**, Assistant Secretary, 63 Center St., Nantucket, Mass.

## 42

**Charlie Stempf** writes that he took out Australian citizenship several years ago and is doing free-lance export consulting. He's currently trying to help a group of Barrier Reef fishermen to build up the export of live salt water tropical fish for aquaria. He reports that he is "still surfing, playing Class 'C' squash, not feeling old but that the policemen are beginning to look awfully young!" The last address we have for Charlie is: 164 Barrenjoey Rd., Newport, New South Wales, Australia. I guess that if anyone is in that neighborhood, they could stop in. . . . **Bill Twaddle** is back in Chicago as general manager of polymer manufacturing for Amoco Chemicals after a pleasant stint as a division manager in Southern Indiana. . . . **Herb Howell** is now with MacArthur & Company, Inc., in downtown Boston.

**Bob Fabacher** of Course II, Vice President and Director of Marketing for JAX Beer in New Orleans, received the National Sales Promotion of the Year award from the National Sales Promotion Executives Association. . . . From an article in the *New York Times*, we note that **Jack Sheetz**, Vice President of Tufts, has announced that the university will not comply with a House Internal Security Committee request to submit



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names of all speakers who have appeared at Tufts in the last two years. Jack's statement which is timely and important was, "We feel that the request immediately suggests grave and ominous implications involving the constitutionally guaranteed right of free speech and other freedoms which the University has traditionally enjoyed and protected."

**Jack Cantlin** left Smithcraft Lighting Corporation and has been appointed president of the Torngren Company Division of Standard International Corporation. . . . **Bob Rines** is leading an expedition including three other members of the Academy of Applied Sciences to Scotland to hunt for the legendary Loch Ness monster! The news release says that Bob's group will try to coax the monster out of hiding using strobe lights, sonar devices and sex stimulants. We'll be waiting for the further reports on this adventure.

**Harry Carter** of the Boeing Company has been elected vice president of the Industrial Marketing Division of the American Marketing Association. . . . Very best wishes to all for a Merry Christmas and a Healthy and Prosperous New Year.—**Ken Rosett**, Secretary, 191 Albemarle Road, White Plains, N.Y. 10605

**43**

As you see, your "real Class Secretary," **Dick Feingold**, is in the midst of a campaign for political office in his home state, Connecticut, so the junior varsity secretariat is taking over this month. Dick is running for State Representative . . . oops! no political plugs, please. Let's just say Dick's a G.O.P.—a grand old party goer! All the best of Irish luck to you, me boy!

The gals on the staff of the *Review* office have written to say: "Some of the clippings this month are hopelessly outdated." So my apologies to those of you who are about to read your name in print. It seems that some of the punched paper tapes (on which such news is

"stored") were used for last spring's Spiro Agnew parade in Boston. These tapes were recently recovered in an anti-pollution paper drive and returned to M.I.T. for processing. No, it's not true . . . the truth is the *Review* staff simply took the whole summer off!

**Joseph A. Polack**, Director of the Esso Research Labs, Baton Rouge, La., resigned from that post on September 1, to become head of the Department of Chemical Engineering at Louisiana State University. Joe obtained his M.S. degree with our Class and went on to the Sc.D. at Tech in 1948. . . . Another Esso man made the news last spring when **Robert K. Dix**, President and Chairman of the Board of Enjay Chemical Company, was named chairman of the 1970 Chemical Caravan. Sponsored by the New Jersey Chemical Industry Council, the Chemical Caravan provides an opportunity for 200 outstanding high school science students to exchange views with distinguished professors and industrial leaders in that state. Bob Dix has spent his entire career with Jersey Standard affiliates and has held a number of positions at their Baton Rouge, La., refinery and elsewhere.

**B. V. Hettich** of the American Viscose Division, F.M.C. Corp., has been promoted to general planning manager on the headquarters staff in Philadelphia. He joined the Chemical Division of F.M.C. in 1959 and has since served in a number of engineering and management posts.

**Carlton G. Lehr**, a staff engineer with the Smithsonian Astrophysical Observatory in Cambridge, has been appointed to the Speakers' Bureau of Morgan Memorial Goodwill Industries in Boston. This agency is the largest voluntary non-profit and non-sectarian group in New England which serves handicapped and disadvantaged people. Morgan is celebrating its 75th anniversary this year. A member of the faculty of Northeastern University, he is a former manager of the Microwave Group, Research Division of Raytheon Corp. . . . **Douglas L. Brooks**, President of Travelers Research Corp., has been appointed special assistant to

the director of the National Science Foundation. Dr. Brooks' first assignment will be marine science policy planning, furnishing broad guidance and top-level coordination for all ocean-related activities of the Foundation.

Rear Admiral **D. Bruce Henderson**, U.S. Coast Guard (ret.), has been appointed chairman of the board of the engineering and engineering technology department of Montgomery College in Rockville, Md. Professor Henderson joined Montgomery College in 1969 after retiring as chief of engineering, U.S. Coast Guard. . . . **Christan J. Matthew**, Assistant Administrator and Director of Planning and Development for St. Mary's Hospital in San Francisco, has been elected to the board of trustees of the Catholic Hospital Association. Chris also serves as chairman of the board of San Francisco's Westside Community Mental Health Center and is a member of the A.I.Ch.E. and the Sierra Club. How about coming down out of those clouds, Chris, and giving us a personal account of your recent doings? . . . Hughes Tool Co. has announced the promotion of **E. J. Pennington, Jr.** as an area engineer for South Louisiana in the company's Oil Tool Division. Jack joined Hughes in 1965 as a field sales engineer at North Dakota and has served in various locations with their nationwide organization.

Cryptic messages in the "back of the envelope news department" . . . Dr. **Miriam D. Manning** writes, "Working in cancer research at Children's Hospital, Boston." . . . **I. J. Frankel** writes "Have recently moved to Tacoma, Washington where I am manufacturing manager of Aerojet General's newly opened Surface Effect Ships Marine Facility." Season's Greetings to all—don't send us a card. But do send us some news.—**Richard M. Feingold**, Secretary, 266 Pearl St., Hartford, Conn. 06103; **A. J. Kelly**, Co-secretary, 32 Scudder Rd., Westfield, N.J. 07090

**44**

I want to thank **Paul Heilman** for handling the Class Notes this summer. As usual, he did a fine job and he cultivated new sources. Let me also wish all of the Class of 1944 a very Merry Christmas (even though it is a balmy day in October at this writing).

This month we have news from 10 of the men. The first of the list, **Robert E. Benedict**, has been named president of the American Mail Line, Seattle-headquartered steamship company. The top job is not new to Bob, however, since he was formerly president of Phelps-Dodge International where he supervised all the overseas manufacturing, investment and licensing agreements. In 1969 the international subsidiary accounted for 24 companies in 19 countries with combined sales of \$100 million. Apparently the American Mail Lines position is more his thing as Bob was budget director of American Export Lines from



1955 to 1958 and, prior to that, he worked in operations and research for Moore-McCormack Lines (1944-1951). In addition, he worked in the shipbuilding division of Bethlehem Steel and for Bath Iron Works.

Next on the list is **Thomas W. Carmody**, Vice President and General Manager of the Process Chemicals Division of Union Carbide. Tom broke into the news as one of the members of the Chemical Engineering Convocation Sponsoring Committee at Tech. . . . And we have an author this month. **Richard F. Cross, 3rd**, wrote a review of *Jane's Fighting Ships, 1969-1970*, in the *Naval Institute Proceedings*, April 1970. Dick has been connected with advanced seaplane design, nuclear seaplane studies, avionics and surface weapons systems, integrated combat system, and with the Navy's DX (destroyer) program. He is presently manager—advanced ship systems, Pomona Division, General Dynamics Corp. In general his review is complimentary but he does state his disappointment in the omission of the new 16-missile Russian submarines which are comparable to the U.S. SSBNs.

One of our classmates, **Nicholas J. Grant** was honored by appointment to the American Academy of Arts and Sciences. This society was founded by a local boy, John Adams, in 1780 so Nick joins the 1970 group which includes Duke Ellington and author Norman Mailer. . . . My faith in mankind is restored! I received a letter from a classmate. **John Hull** wrote that he attended a wedding of his niece near Scranton. During the ceremony Betty and **Bud West** greeted him and, come to find out, Bud was an uncle of the groom. Bud had just completed two weeks of Reserve duty in Boston and was then heading back to his home in Newport News, Va. They reminisced fondly about the glorious reunion in 1969. John added that the Hulls were spending most of their time trying to keep up with the three boys, both actively and financially.

In a completely different area Professor **Lawrence R. Klein**, was written up in *Business Week* for July 4, 1970. Larry is at the Wharton School of the University of Pennsylvania where he has developed an econometric model. The article compared his predictions of the Gross National Product with predictions from other large models and stated Larry was the most conservative. Today I was able to check that statement since the GNP for the third quarter was announced to be \$985 billion, slightly higher than Larry's estimate of \$980. The Wharton team had warned last November that a recession was on the way so Larry's batting average is very good.

The next classmate in the news hit the jackpot. The appointment of **Justin M. Margolskee**, to the newly created post of assistant general manager—operations for Raytheon's Missile Systems Division, was reported in three newspapers in the Boston area. The one from the Belmont *Citizen* was best because it contained

Justin's picture. He is a V.P. who has served as Raytheon's manager of the Bedford labs since 1963. With the company since 1947, Justin advanced through a series of engineering and engineering management positions to vice president in 1968. He is a registered Professional Engineer, member of the I.E.E.E., American Ordnance Association (how else do you sell missiles?), A.S.M.E., and Tau Beta Pi. Justin and his wife live in Lexington and have four children in ages from 11 to 19.

Don't give up, more are coming. **Robert D. Peck**, was elected executive vice president of the American Association for Contamination Control at the annual meeting in Anaheim, Calif. Bob is President of the Controlled Environment Equipment Corp. in Brockton and has been involved in the technology of contamination control since 1959. A former treasurer of the Society, he is active in community affairs and is chairman of the Needham Adult Education Advisory Board. . . . I believe I mentioned in prior notes that **William Ritterhoff**, has been elected vice president—manufactured products, Bethlehem Steel Corp. (Sorry I can't check because today is the day ITRI is moving our group from Annapolis, back to Washington, so everything is boxed.) Anyway, Bill started at Bethlehem in 1948 as an assistant engineer at the Sparrows Point, Md., plant, worked up to assistant superintendent and then moved to assistant chief engineer of the Burns Harbor project in Indiana. He was named general manager of the Burns Harbor plant in 1967.

Last on the list comes **Allen J. Vander Weyden**, who has been appointed director—advanced systems and technology division, McDonnell Douglas Astronautics Company-West. With a company name that long, I can see why they use the initials MDAC! The press release stated, "A nationally known nuclear scientist, Dr. Vander Weyden held several senior positions with the Atomic Energy Commission before joining the company in 1965. He received the A.E.C.'s highest honor for employees—the Distinguished Service Award—in recognition of his technical and managerial leadership of several complex reactor development programs. His functions at McDonnell Douglas include the development of advanced space and missile systems and advanced technology and applied research programs." . . . Das ist alles.—**John G. Barmby**, I.I.T. Research Institute, 1825 K St., NW, Washington, D.C. 20006 (Hint-write!)

## 45

Let us leave the year 1970, our 25th anniversary from the Institute on a sober thought-provoking note rather than the joyous reunion vein suggested by our most recent notes.

**Jim Hoaglund** made a most interesting observation one evening at the reunion that was more or less as follows: "When

Mary, the kids and I attended our 15th reunion at Snow Inn, I was still self-employed in Phoenix, Arizona. As a result I was particularly interested in my talks with the gang as all the so-called corporation employees were deeply involved in their constant struggle to gain recognition and advance up the corporate ladder. Today I'm deeply involved with this ladder as Vice President and Technical Director, Commercial-Industrial Products at I.T.T., yet I have a strong desire to start anew in a different direction. As I talk with others here at the reunion I detect an unrest, a dissatisfaction with the status quo, an anxiety to do something else once the kids' educations have been guaranteed and we can meet our immediate or apparent financial needs."

**Bill Blitzler**, Senior Vice President of Lightober concludes his Reunion Booklet with the following comment: "Eventually I would like to find a broader involvement of some sort in public life. This is one of the challenges I see as I look ahead." A similar reunion discussion with **Dick Martin**, President of Decision Systems in Rockville, Md., prompted Dick to forward a couple of letters he had received from **Bob Bronson** which, in part, follow. "January 26, 1969: A year ago this month I became an 'executive dropout' and have decided that it is about time that I began letting folks know about what I'm doing. My story begins in the fall of 1967 when I woke up to the fact that we had reached one of the major goals, i.e., having enough money invested to cover the education of our children and it was time to start setting some new goals. Goals like a bigger job, more responsibility, more money, bigger house, etc., all seemed uninteresting and dull. I finally got excited about going back to college and starting a new career. In January 1968 I resigned from Texas Instruments after 17 years and entered the University of Texas in Austin some 200 miles from here (Dallas) so I have been commuting on the weekends. I entered the undergraduate school for the 1968 spring term taking sociology and psychology courses to get a minimum of prerequisites for graduate school. I will start my third graduate term on February 3. I could terminate in August with a Master's degree but it's going so well and I'm enjoying it so much that I am now planning to get my Ph.D.

"February 11, 1970: My program is moving along rather rapidly. This particular term is extremely pleasing to me as I have 3 three-hour courses with the same professor who will be my supervising professor. These three courses will give me the total hours that I need for a Ph.D., so all that remains will be my dissertation which will take at least two terms. I have registered for the first three-hour seminar; the second three-hour seminar will come either this summer or next fall and is totally dependent on my meeting the language requirement. I don't have any plans as to what I am going to do when I finish, but whatever it is, it will combine

Crowded skies? Not so, claims the MITRE Corporation where many M.I.T.-trained air traffic control experts have come to the conclusion that "there is plenty of room up there—if you know how to use it."

# The National Airspace System—Catching Up with the Future

Why we must suffer potentially dangerous snarls along our air corridors and what can be done to eliminate them has for some time been under investigation at the MITRE Corporation. "Air Traffic Control system development has been and continues to be done on a shoe-string," says Howard J. Kirshner, EE'54, who heads MITRE's Air Transportation Systems Division. "We need to provide for a continuous development program. That will cost money, but we have been in the habit of spending too little in the past. R and D, engineering and management costs for system development and implementation have been consistently underestimated." Mr. Kirshner should know, for he and many other M.I.T. alumni at the MITRE Corporation have been developing elements of the new National Airspace System for the F.A.A. since 1963. The goal of N.A.S. is to give the air traffic controller a better break through automation, thus making air travel safer for us all.

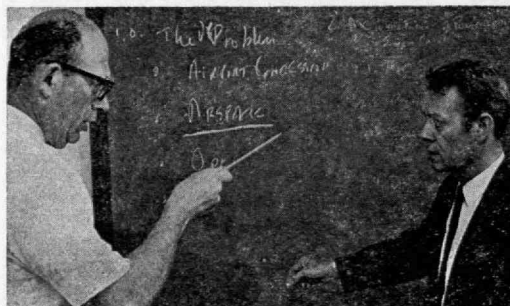
"N.A.S. introduces computer aids for planning and monitoring," explains Frederic E. Irish, S.M.'52, Terminal System Engineering and Development department head, though the air traffic controller must continue to perform his traditional tasks. "The computer, receiving the flight plan, predicts when the plane will arrive in the airspace, and distributes flight routing information to the controllers. Radar information is digitized at radar sites and sent over telephone bandwidth communication channels to the control center. This radar information is combined by the computer, so that the controller can view on the display screen the integrated coverage of several radars. This process is known as 'mosaicking.' Automation, in the form of computer-aided tracking of aircraft, is used to orient the monitoring function. Identities are associated with tracks displayed to the controllers, and carried along with the track as the aircraft flies through the control region." The system, now in operational testing stages, will soon be in use at airports along the nation's major air traffic routes.

But according to Oscar Morgenstern, '59, Associate Department Head for Terminal System Engineering and Development, the N.A.S. En Route Stage A now being

tested cannot meet air traffic control requirements past 1980.

Advanced development aimed at increasing the capacity of the airport/airway system to accommodate the demands of air traffic in the 1980 to 2000 period—is already underway. According to David Bailey, '49, Associate Technical Director of MITRE's Air Transportation Systems Division, "We're dealing with all the things that must be considered in planning for future air transportation needs: airport capacity, en route and terminal airspace capacity, and automated [fourth generation] air traffic control system, and so on.

Despite the increased expectations and demands on this 4th generation system, MITRE expects that N.A.S. will not have to be torn up by the roots to make way for it. "Fortunately," says Charles Zraket, S.M.'53, "N.A.S. won't be obsolete. Its data processing framework will provide a baseline for the future system. And when the future system is operating, the controller who today must maintain active control of aircraft will instead become a monitor and problem solver who need not intervene in the system unless something unusual comes up." Meanwhile, we pay our money and we take our chances.



*On the National Airspace System team are: (clockwise from 12 o'clock) Frederic E. Irish, S.M.'52, (left) Head of the Terminal System Engineering and Development Department, and Oscar L. Morgenstern, '59, Terminal System Engineering and Development Associate Department Head.*

*J. Paul Locher, '58, (left) System Test and Design Verification Department Head and John Varela, '57, Associate Head of MITRE's En Route System Development Department.*

*Senior Vice President Charles A. Zraket, S.M.'53.*

*Howard J. Kirshner, '54, (left) Technical Director, and David Bailey, '49, Associate Technical Director.*



my engineering, management and psychology work and also the criteria of being challenging and changing. I suspect this means being in business for myself as a consultant." One might conclude that he is in good company should he, too, have that itchy feeling. Yes, Bob Bronson received his Ph.D. on August 25 just three days prior to his oldest daughter's wedding—the first in the family.

Each of us—and that is all your classmates and their families—wish each of you Season's Greetings and Best Wishes for the New Year.—**C. H. Springer**, Secretary, c/o M.F.B. Mutual Insurance Company, 420 Lexington Ave., New York, N.Y. 10017

## 46

The feel and aroma of autumn is in the air as I write these notes from the back porch this evening. It has been a good summer, and I hope all of you also experienced a pleasant, rewarding summer.

**Edward J. Bacon** was kind enough to send a report from his home in Rockville, Md. Ed, his wife, and three competitive swimming children 13, 11 and 8, enjoy the Maryland countryside and the Washington, D.C. area. Ed has spent most of his life, after leaving M.I.T., in Washington, D.C. in technical systems analysis for the government or government contractors. Ed recently left as V.P. of Booz, Allen to join Exotech, Inc. also of Washington as Project Director. Ed has been active in the M.I.T. Washington downtown lunch group and so has kept in touch with M.I.T.ers through the years.

**Bill Siebert** has been connected with M.I.T. almost continuously since graduation. Receiving his Doctor of Science in electrical engineering in 1952, he then spent the next three years in the Lincoln Lab working on radar. He is now in the Electrical Engineering Department of M.I.T. concerned with biomedical engineering and the physiology of the auditory system. Bill, his wife and four children, ages 2 to 18, are all active in skiing, sailing and camping. Bill is fortunate, too, to have several other '46ers, Jim Craig, Ted Heuchling, Fitch and Slade living near him.

**Richard Riley** has retired from the U.S. Navy after 26 years of service. Dick is now manager of Customer Relations for the Iowa Power & Light Company in Des Moines. As Dick jokes, Des Moines is as far from salt water as a retired Navy Captain and Naval Architect and Marine engineer could settle. . . . **Russell A. Foust** has recently been promoted to supervisory research chemist in charge of the electrochemistry and materials research section of the Electrochemistry Department of General Motors Research labs at the G.M. Technical Center at Warren, Mich. They cover all phases of electrochemical research including research on various power sources for electric automobiles.

**M. A. Ricker** is Chairman of the Science and Mathematics Department and instructor in physics at Cypress College, Cypress, Calif.

**Alan R. Gruber** continued his education in Course II after graduation in 1946, obtaining a master's degree from Harvard. From 1948 through 1957, Alan was with Nuclear Development Corporation. From 1958 to 1961 he was division director of the Marquardt Co. of Van Nuys, Calif. In the period 1961 to 1964 Alan was vice president and chief operating officer of Capital for Technical Industries, Inc. which engaged in the development and financing of new technology businesses. In 1964 Alan joined Electro-Optical Systems, a Xerox subsidiary, as vice president for planning and commercial products. Alan was instrumental in planning this company's transition from a research-oriented to a commercial producing concern. In May of this year Alan left Xerox to join Heublein, Inc. of Hartford, Conn. as vice president in charge of corporate development.

**Roger Sonnabend's** Hotel Corporation of America has changed its name to Sonesta International Hotels Corporation. The word Sonesta has no actual linguistic meaning but was developed from the names in the Sonnabend family. It is not difficult to determine that the Son in Sonesta must come from Sonnabend. I regret I do not know any of the other members of the family to help you complete the last four letters. This corporate name will be used on most of the company's properties except for the established names like the Plaza in New York, Washington's Mayflower, and Nassau's Balmoral Beach. Sonesta is opening a new Sonesta Beach Hotel in Nassau as well as new urban hotels in Milan, Montreal and New Orleans. In the planning or building stages are Brussels, London, Munich, Hamburg, Frankfurt, Toronto and Vancouver.

**Gerome Gordon**, executive vice president of the Salem Corp., has been appointed president and director of a newly acquired company, Herr Equipment Corp. of Warren, Ohio. The Herr Equipment Company designs and manufactures coil processing lines for ferrous and nonferrous industries. Salem Corp. (formerly Salem-Brosius, Inc.) is a designer and builder of mechanical equipment and industrial furnaces. Gerome just recently joined the Salem Corp. For the previous 23 years Gerome was with the Swindell-Dressler Company, a division of Pullman, Inc., serving as the sales-marketing vice president.

**Pete Peterson** has been appointed to a joint committee of the New York State School Boards Association and the New York State Council of Chief School Administrators to study public school management methods. . . . **Andrzej B. Przedpelski** is the chief engineer of A.R.F. Products, Inc. of Boulder, Colo. Andrzej lives at 7260 Terrace Place in Boulder. . . . **Thomas F. Malone** addressed the joint meeting of the Engi-

neering and Scientific Manpower Commissions in New York City. This address, was titled "Moral Issues in a Modern Technological Society." . . . Three '46ers attended the M.I.T. homecoming in June, **Dave Black**, **James S. Goldstein** and **Arthur Taylor**.

Now here is an item that will make you know we have all reached 45 years. Two more sons of classmates have entered M.I.T. as freshmen: **Eric H. Bott**, son of **George Bott**, and **Roger N. Goldstein**, son of **Stanley J. Goldstein**. . . . We are eight months away from the 25th reunion in Cambridge. The report indicates that through June 30, 1970 we have reached \$110,056 in our goal of \$400,000 by reunion day. Please be generous when you are called on to contribute to the 25-Year Gift.

Please send us a brief note on your activities. The completion of these notes leaves us with very little material for future reports.—**Russ Dostal**, Secretary, 18837 Palm Circle, Cleveland, Ohio 44126

## 47

My apologies for my second absence in the *Review*. Vacation and golf usurped my time when the notes were due but also I was not deluged with notes or letters to keep me up with the latest happenings. Recently, I received a very pleasant and refreshing letter from **Al Richardson** who noticed reference in the notes to a paper that he had authored. "Actually, my main interest for the past 10 years (besides golf) has been in the electric power industry. As consultant to the Edison Electric Institute and a number of utility companies and suppliers I have developed a number of products in my own interests as well as for other companies. Altogether I have 12 patents issued or pending in the U.S. and six foreign countries. Nine utilities are using my inventions in the U.S., Canada, Great Britain, Belgium and Japan. I have published papers for the I.E.E.E., and international conferences in Canada, Great Britain, and France and have license agreements with two major suppliers of equipment. In spite of this, I still consider myself a struggling inventor! You might say that I am combing the business world for opportunity wherever I can find an interesting situation. N.B. Have recently acquired sales rights from Helio Aircraft Company to sell their product line to the power industry for transmission line patrol work.

"If this sounds like a modern-day Walter Mitty episode—don't think I haven't had time for our favorite sport! The enclosed clippings will give you a general idea of the exploits of the Richardson Household on the local links. Incidentally, I have also been to Golfer's Mecca—St. Andrews, Scotland—with my wife on vacation in 1963. (I shot a 76 on the old course in a driving rain.) Personally, I prefer Port Marnoc, just outside Dublin as a true test of the game in the classic links tradition. I would like nothing better

than to compare golf fables with you, old friend, and I hope you will look me up when next in Boston. I will do likewise when next I visit Cleveland." The clippings referred to show that Al and offspring are doing well in the Greater Boston golfing circles. It is pleasing to note that the Boston press is continuing to actively support and publicize their local amateur tournaments—such is not the case in many areas of the U.S. Al's letter is quite timely despite the fact that I have put away the clubs for the year in frustration since these notes are being written during a break in the IEEE-ASME joint power conference in Pittsburgh. Al has presented several papers to affiliate groups.

A note from **William Shaeffer** points out that he "sincerely hopes that Tech will stiffen its backbone against those who would tear down the place" as he is "not pleased with the way things have gone in this regard." . . . **Larry Powell** writes ". . . after 20 years as an 'India Rubber' man in New England I have succumbed to the challenges of the Akron-Cleveland area. So for the past three years we've been skiing the hills that go down not up. We live in Bath on the edge of the Cuyahoga River Valley. It is not like the shores of Narragansett Bay, but the banks of the Yellow Creeks have a charm of their own. We see Al Seymour, '44 on his occasional trips to find out what we are doing at the Development Center. Al is Technical Director of B.F. Goodrich Sponge Products in Shelton, Conn." Note those are Larry's words but for you uninitiated or spoiled by multi-thousand feet snow-capped mountains let me explain that Ohio skiing is essentially a 300-foot drop down to a river bed.

Among those moving we note: **Brooke Pietsch** to Paris, France; **Gabe Ciccone** to Arlington Heights, Ill.; **Dr. Bob Drye** to Carmel, Calif.; and **John Kellett** with Esso to Naha Okinawa. . . . The Navy has promoted to Captain, **Wayne Meyer** and **Bob Blount**. The former now in Falls Church, Va., and the latter out of Charleston, S.C. . . . As an indication of the passage of time I see that Elizabeth, the daughter of **Jim Bagnall** of Bethesda, Md., is among the entering class at M.I.T.

Jim, besides being in the class of '47, was also in my graduating class from Watertown, Mass. High. Also in the entering class are James, son of **James Cooley** of Portland, Conn.; Dirk, son of **Howard Zwemer** of Kensington, Md.; and Mathew Kaufman, stepson of **Bill Cullin** of McLean, Va.

Our Class was represented at Alumni Day by Mr. and Mrs. Ben Brewster, Marty Haas, Bob Hagopian, Mr. and Mrs. Ken Klingensmith, Morton Loewenthal, Bill Page, Marty Phillips, and Mr. and Mrs. Jack Rizika. . . . Mrs. Phillip Wagley (**Mary Frances Penney**) is the first woman elected to the Corporation of M.I.T. She is one of six members elected for a five-year term. Mary Frances received her doctorate in chemistry from

Oxford in 1950 then taught at Smith College before moving to Baltimore where she resides with her physician husband and their three children. She was on the staff at Johns Hopkins for several years and is now Headmistress of St. Paul's School for Girls, a private secondary school. . . . From the clipping services we see that **Al Draper** is heading up research work at Penn State on ferrous die casting processes and **Harl Aldrich** has done considerable work on subsurface conditions in the Back Bay Area.

**Walt LaForce** has been promoted to department manager, unit and instrumentation program by the Ritter Co., Rochester, N.Y., a manufacturer of dental and medical equipment. . . . **Ben Ranan**, formerly a vice president of Transiron in Wakefield, has been named president of Frenchtown I.C.F.I., a subsidiary of Alloys Unlimited. This Frenchtown, N.J., concern makes simple and intricately shaped ceramic parts and assemblies used in the electronics industry.

Though I have not seen any classmates did manage to converse with two fraternity brothers Whit Mauzy, '48 and Don Merriman, '49 who originally started with our class. Among other things Whit is dabbling in politics in Tulsa and distributing an anti-smog device for motor vehicles. Don is executive vice president of Buckeye Pipeline and having loads of fun picking up pieces and making reports as part of the parent Penn Central financial debacle. . . . The cocktail hour is beckoning so will sign off until next month. Write!—**Dick O'Donnell**, Secretary, 28516 Lincoln Rd., Bay Village, Ohio 44140

## 48

A note from **Norman Shillman**, Course XIV, advises that he is vice president of Shillcraft Readicut Rugs. His product is materials for making hand-hooked rugs, imported from England. Norman is married and has three daughters and one son. He recommends jogging to his fellow classmates. Norman recently fabricated a rug canvas with the emblem of Apollo XIII. Although the mission was ill-fated, the astronauts have their rug.

**Murray C. Goddard**, Course VIII, of the Kodak Research Laboratories, has received honorable mention for the engineering paper award for "An M.T.F. Meter for Film." Congratulations, Murray. . . . Professor **Dean S. Ammer**, Course XV, director of Northeastern University's Bureau of Business and Economic Research, gave a major address at a conference of the European Federation of Purchasing on May 21, in Copenhagen. Professor Ammer is author of the book *Materials Management* and his articles appear regularly in the *Harvard Business Review*. He holds a bachelor's degree in engineering and business administration from M.I.T. and master's and Ph.D. degrees from New York University.

**Roger L. Sisson**, Course VI, was a speaker at the "Urban Systems Engineering" conference sponsored by the Engineering Foundation in July at Henniker, N.H. . . . **Charles C. Noble**, Major General, U.S. Army, Course I, wrote from Europe describing his assignments which have taken him around the world. He is currently chief engineer for the army in Europe. Previous assignments have been in Korea, Southeast Asia, Louisville, New York, and Washington. . . . **Jack Page** and his wife Imogene attended the 1970 M.I.T. Mexico City Club Fiesta. Also attending was **Harold S. Dutton**. Thanks to Warren J. Henderson, Secretary of '33, for the report from Mexico City.

**James Dugundji**, Course XVI, has been promoted to professor of aeronautics and astronautics at M.I.T. He received his B.Sc., M.Sc., and Sc.D from the Institute.

**Holt Ashley**, Course XVI, has been elected to the National Academy of Engineering. Holt is professor of aeronautics and astronautics at Stanford University. . . . **Glenn W. Stagg**, Course VI, presented a paper on computer applications at the I.E.E.E. 1970 National Meeting. Glenn is assistant vice president and head of the Computer Applications Division at the American Electric Power Service Corporation. . . . **Carl Blake**, Course VI, is head of the phased-array radar group at M.I.T.'s Lincoln Laboratory. He was recently quoted in *Electronic Design* in an article on phased-array radars.

**J. W. Lathrop**, Course VIII, is professor of electrical engineering at Clemson University. Professor Lathrop was with Texas Instruments, Inc., for 10 years prior to joining Clemson's faculty. This summer Professor Lathrop served as director of an international lecture series held in Europe on large scale integration in microelectronics. . . . **Frank E. Jamerson**, Course VIII, has been named head of the 75-man physics department at General Motors Research Laboratories. He joined G.M. as a senior nuclear physicist in 1957. . . . One of our classmates, **John M. D. Walch**, has been appointed as a member of the Essex County Government Study Commission to study the operations and relationships of the County Department and Agricultural Municipal, State, and Federal functions. . . . **J. Kail Crane**, Course I, chief engineer of administration of the Cook County Highway Department, is in charge of computer and data processing as well as administrative services technical photography, and safety and training divisions of the department.

A brief note advises that Mrs. **Charlotte (Claude) Fraser** Course VII, has received her master's degree and has previously had Community College teaching experience. Nice to hear from you, Charlotte. . . . **Stanley Berinsky**, Course VI, is currently manager of Tactical Systems Engineering & Evaluation in Sunnyvale, Calif., at the Lockheed



plant. . . . A note about myself. In August I was promoted and I am now responsible for planning and implementing venture activities for the Fram Corporation (Fram Filters). Our activities will rely heavily on utilizing resources from within Fram's existing divisions. I expect to use existing manufacturing facilities in conjunction with newly formed sales organizations in some markets. A unique monitor for detecting oil in compressed air developed by my people while I was with R & D has been added to the product line of a division. I was happy to culminate 18 years of laboratory activity with the introduction of this product. I don't expect to invent another product like the fiberglass cord which Dick Baker, '48, introduced in his timing belts in 1958. The same basic fiberglass cord became the basis of the belted Fiberglas tire. Since the patent on the cord runs out in 1976, I think it appropriate to move ahead at this time.

My new work involves considerable emphasis on the financial projections of profitability. It has been exciting untangling the jargon of the financial world. I don't expect to find physical laws governing the functioning of the corporate body, but I have already seen the importance of identifying just what physical happenings are represented by every abstraction such as "costs" or "profits."—**S. Martin Billett**, Secretary, 16 Greenwood Ave., Barrington, R.I. 02806

## 49

These Class Notes are due in the week following the 1970 Alumni Officers' Conference which I attended at M.I.T. October 15, 16 and 17. Twenty-two members of the Class of '49 signed up for the conference, although I think one or two less than that actually attended. (Numerically, we were second only to the Class of '22 with 30 representatives and were followed closely by our neighboring class of '48 with 17 members.) Mysteriously, two of our classmates, **Marvin J. Byer** and **Russell N. Cox**, had asterisks in front of their names in the listing of potential attendees. Since there was no explanation of these asterisks and since they were the only two in the entire list of all classes to be so honored, their Secretary is at a loss to explain the distinction, although Russ was deputy chairman of the organizing committee for this year's Alumni Officers' Conference. [The asterisks were a correction signal for a slip up in alphabetical sequence.—Eds.] **John W. Barriger** served as a chairman of morning and afternoon sessions on Friday.

Four classmates were presented awards of one kind or another during the course of the conference. 1970 Alumni Fund Certificates of Appreciation were presented to **Leonard F. Newton**, retiring Fund board member, and **Frederick I. Brown, Jr.**, New Orleans area leadership chairman. As your Class Secretary, **Frank T. Hulswit** found himself one of 34

class secretaries awarded certificates of appreciation for having Class Notes in every issue of Volume 72 of the *Technology Review*. **William C. Howlett** was one of 39 alumni given a Presidential Citation for sponsoring a new and imaginative program of seminars for young alumni. Bill was a member of the Washington, D.C. committee.

On Friday afternoon I attended a panel discussion of experimental undergraduate education where I learned about two exciting and innovative alternative programs to the standard freshman course of studies. One of these, called USSP, was referred to cryptically by **Barbara (Feeney) Powers** in last issue's column. I now understand her enthusiasm for the opportunities provided her son, Stephen, in this program last year.

I still have no list for the Spring class cocktail party—all I have been able to get out of **Paul Weamer** so far is a bill for my portion of the cost, still unpaid. Last weekend I agreed to pay cash for information, so perhaps next month I will have the missing list.

From the Alumni Fund envelopes, four notes this month. **John Barriger** reports that he became assistant to the president of the Santa Fe Railway in Chicago on October 1. . . . **Archie Harris** reports: "Following departure from North American Rockwell and defense industry, joined Sub Terrain Irrigation as director of marketing. Assumed duties of general manager September 17, 1970, and find myself deeply committed to new way of life . . . profit making! Ken is a Junior at the University of California at Santa Barbara and Diane is modelling. Audrey and I are well." (Note to **Fletch Eaton**—Archie sends love to Nell and the kids. I don't think he's noticed that you passed the secretarial baton to me last year.) . . . Lieutenant Colonel **H. M. Federhen** checks in with: "I'm still stationed in Washington, working with the Defense Communications Planning Group. Although I don't think I'm old enough to have children in college, my oldest son starts at George Washington University this year. Sic transit something." . . . Finally, **Philip A. Lynn, Jr.**, reports that he resigned in August as chief, design and construction division, Public Buildings Service, GSA, in New York—after 15 years of Federal service—to become project manager on the Travelers Insurance Company project in Hartford, Conn., with Turner Construction Company. He notes "It's a real pleasure to be in a position where I can get out from behind a desk and go where the action is—at least part of the day."

A delayed press release from Rice University provides news of **Harold E. Rorschach, Jr.**, Professor of Physics and Chairman of the department. For the third time, Hal won a George R. Brown Award for Superior Teaching, carrying a \$1,000 stipend. Each year six such prizes are awarded to Rice faculty members in addition to an excellence in teaching prize with a \$4,000 stipend.

This certainly seems like a pleasant and effective way to encourage and award good teaching. Congratulations, Hal.

In connection with a change of address as he settled into Mexico City, **Charles W. (Carlos) Davis** reports as follows: "After 2.5 years in Europe, we put the motor home in storage in Switzerland and decided to come back to Mexico for a year or so. . . . I have been catching up with M.I.T. from all the *Technology Reviews* that have accumulated since 1967, and was particularly impressed with the letters from President Johnson giving me the first idea of what went on early this year and the firmness with which he dealt with the situation. The only point of interest that intrigues me at the present is that my financial advisor projects that the Dow Jones will drop below 200 before it finally bottoms out. This would seem impossible were it not for the fact that he has been batting 1000 on the market ever since 1949. Feel better? P.S. **George Piness** flew down to see me in Switzerland once on a business trip to Holland—so I cooked him a meal!"

I find seasons confusing in my role as Class Secretary. Two weeks ago it was summer-like here in Concord. Two days ago we had snow flurries, and I am reminded that now is my last chance to wish all of you a Merry Christmas and a Happy and Successful New Year. So be it.—**Frank T. Hulswit**, Secretary, 77 Temple Rd., Concord, Mass. 01742

## 50

Merry, merry, Christmas to all classmates!!

Ginocchio, Cromwell, Carter, and Neyland, a leading architectural firm long established in building banks throughout Arkansas has announced a name change and the addition of three new partners. The new name of the firm will be Cromwell, Neyland, Truemper, Millett, and Gatchell. **Robert H. Millett** has been associated with the firm for a number of years. He is a Corporate Member of the American Institute of Architects. He is married to the former Marian Davidson of Little Rock, and they have two children. . . . **James Bain, Jr.** joined the Dayton Criminal Justice Pilot City Project as of August 1, 1970. Since his graduation in 1950, defense has occupied all his time. Now the challenge of crime prevention launches him on a new career. Jim hopes the math and computers that made engineering so successful can reduce the crime rate.

Professor **Carl F. Long** is a specialist in elasticity and structural analysis and design at Dartmouth College. He came to Dartmouth College in 1954 as an instructor, was promoted to assistant professor in 1957 and to associate professor in 1964. He was awarded the Ph.D. degree by Yale University in 1964. He worked as an outside plant engineer for Western Electric Co. and as a consultant for several New England companies. Professor

Long was also an assistant teacher from 1950-52 and a research engineer from 1952-54, both at M.I.T.

Diamond Shamrock Chemical Co. has promoted **Gordon D. Sargent** as chief project engineer for its Nopco Chemical Division in Newark. Gordon lives in Morristown and joined Nopco in 1967 as a project engineer. He has contributed a number of articles to trade publications.

After working for Radio Free Europe as a communications engineer in Munich, Germany in 1956, **Alexander MacMullen** joined the Raytheon Company where he developed several military and commercial microwave equipments. In 1963 he joined Hughes Aircraft Company where he was responsible for the design of state-of-the-art transmitter-receivers for high resolution synthetic array and multimode radars. Mr. MacMullen joined Technology Service Corporation in 1969 as Manager of the Transmitter-Receiver Department. At T.S.C. he has formulated concepts for practical hardware implementation of several advanced radar systems. . . . **John R. Clark, Jr.**, has been named vice president—Eastern Region of Bell Aerospace Company. Mr. Clark joined Bell in 1964 as a Washington representative. He became director of the Eastern Region in 1966 and served during 1968-69 as executive director of marketing at the company's headquarters near Buffalo, N.Y. He completed the Advanced Management Program at the Harvard University Graduate School of Business Administration in 1968. For five years prior to joining Bell he was associated with Thiokol Chemical Corporation as assistant Eastern Region manager in Washington.

**Jack C. Acton** has been named manager of engineering for the General Electric Co.'s Westover plant. Mr. Acton joined General Electric in 1950 as design engineer for induction motors with the small and medium motor department in Schenectady. His engineering career with the company included service as program manager for the Minuteman system. Mr. Acton is married and has two teenage children. The family soon will move to Binghamton. . . . **Thomas Howitt, Jr.**, has been named general manager of Corning's Glass Works Electronic Products Division. Mr. Howitt joined Corning in 1950 at Parkersburg, W. Va. In 1952 he was transferred to Corning, N.Y., where he served in machine design and process development positions, including seven years as director of process research. He was elected a vice president in 1968 and since then has served as director of the Corporate Development Division. . . . **Charles Chittick**, Industry Analysis and Specialist Coordinator, and **Harry Foden**, Application Specialist, both for Arthur D. Little, Inc., will be among those who will make up the study team for the forecasting program, "Prospectus for the Growth Patterns of U.S. Industries and Markets."

**Peter W. Plumley** of the Travelers Insurance Company, has been transferred

as second vice president to the Tax Planning Division of the Law Department. He joined the Travelers in 1950 as an actuarial student in the life actuarial department. He was named an assistant actuary in 1958, became an associate actuary two years later, and in 1963 was promoted to actuary. In 1966 he was named second vice president and actuary in the corporate actuarial department. A native of Newton, Mass., Mr. Plumley received his J.D. degree in 1964 from the University of Connecticut School of Law and that same year became a member of the Connecticut Bar. A Fellow of the Society of Actuaries, Plumley is a member of the American Academy of Actuaries, past president of the Actuaries Club of Hartford, a member of the American Bar Association, education chairman of the Society of Actuaries, and treasurer of the Civitan Club of Hartford. He is married, has four children and lives in Glastonbury, Conn.—**John T. McKenna, Jr.**, 2 Francis Kelly Rd., Bedford, Mass. 01730

## 51

As we work our way further into the reunion year—(20 years!)—looking forward to all of that good fellowship, etc., at the Provincetown Inn, Cape Cod, this is what's making class news. **Joe Amblard** is President of Associated Instrumentation and Controls Ltd. in Montreal, Canada. His family: wife Mary and their two youngsters Jody, 13 and Julie, 11; his hobbies: travelling, winter and summer sports and bringing up children.

**Mihran Ayvazian** is single and works for Boeing, but I'm not sure where. His home address is listed as Arlington, Mass., and the postmark on his card was blurred. . . . **Frank (Jack) Binns** is still with Texas Instruments (Nee Metals and Controls), in Attleboro, Mass. Jack and Audrey have three children, ages 17, 13, and 8, and live in Attleboro. . . . **Carl Burtoff** was recently promoted and now works for the Veterans Administration in Washington, D.C. as a mechanical engineer (estimator). He and Martha live in Alexandria, Va., have two daughters, ages 16 and 15 and two sons, ages 12 and 10.

**Charles Compton** is Chairman of the Science Department at Phillips Exeter Academy, Exeter, N.H. and an instructor in physical science there. After M.I.T. Charles received a master's degree in education from Harvard and from 1957-1958 was Assistant Director of Harvard's A.Y.I. During 1965-66 he was at the Nuffield Physics Project at Malvern College, England. In between and currently he has been at Phillips Exeter. He has an interesting article in *The Physics Teacher* (May, 1970) titled "Exercises are not Problems." The article deals with the use of problem solving sessions as a teaching mechanism. The substance of it appears to be that exercises are just that: warm-up sessions to acquaint the student, and limber him up mentally. On the other hand, problems should re-

quire more initiative and more of an inquiring approach. The answers should be given to exercises, whereas a problem may have a debatable answer. I hope I haven't done the article an injustice; it was interesting. Elizabeth and three children, ages 8, 14 and 17 complete the Compton family.

**Peter Darin Jr.** left his job as Manager of the Architectural Engineering Departments of the Argonaut Division of General Motors to become Vice President of Darin & Armstrong, Inc. a large industrial contractor in the construction industry.

Monica and **Patrick Griffin** and their five youngsters (1, 2, 4, 6 and 8) have moved to the warmth of Ponce, Puerto Rico where Pat will be Manager, Maintenance and Engineering, for Puerto Rico Olefin's new plant scheduled for operation in the first quarter of 1971. **Frank Jacobanis** was written up in the sports column of the Boston, Mass. *Argus Citizen* (which, I gather, comes out of Hyde Park, Mass., Frank's home town). Frank is stationed aboard the S.S. *Manhattan* as engineering officer. The *Manhattan* is the largest Ice Breaker afloat and is the boat (ship?) which made the trip through the North Pole the hard way. Frank was an active and successful baseball player at M.I.T. and apparently in high school also. . . . Another entrepreneur joined the ranks: **George L. Larse** resigned his position as program manager at Lockheed Missile and Space Co. to form Larse Corporation. Located in Palo Alto the corporation will use advanced MOS/LSI technology to develop and produce industrial electronic products.

The first of our classmates to have children enter M.I.T. appear to be two who received their graduate degrees in '51: Professor **Arthur B. Metzner** Sc.D. X, (daughter) and **Bajirao Gokhale** Ph.D. VIII, (a son). I'm surprised that there aren't more children of '51ers entering Tech. After 20 years some of you should have children in college. . . . Bell Labs recently announced the promotion of **James McKenna** to Head of the Mathematics of Physics and Networks Department. Jim joined Bell Labs in 1960 and has authored a number of articles in the fields of optics, statistical mechanics, quantum field theory and the like. . . . **William F. Moon**, his six daughters (17 through 5) one son, 12, and wife Consuela have moved to Buchanan, Mich. Bill is with National Standard Co.—Machinery Division. Last time we mentioned Bill he invited classmates to drop in if they passed through Atlanta—right after that he moved to Michigan—any significance? . . . The **Henry Shermans** are living in Tulsa where he is V.P. of Ace High Drilling Co. Children: three—Barbara 18, Leslie Anne 11, and Bill 8.

Skiing and sailing make up the spare time activities of Professor **Stanley Vegors**, his wife Ann, and their three youngsters: Eric, Susan and Heidi. Stan does his professing in the Physics Department at the University of Idaho in



Pocatello. . . After just reporting that **Roy Weinstein** was at Stanford, a change of address indicated that he was back in the Boston area. The mystery, such as it is, was cleared up with a note from Roy. He is a full professor at Northeastern University in Boston where he has been on the staff since 1963. He received a two year Guggenheim and N.S.F. Fellowship to do research in high energy physics while reconsidering the structure of graduate education in physics. He spent his first year at Stanford and is spending his second year at Harvard.

**John H. Wetzel** writes: "wife: Marlene; children: Kurt 4½; Company affiliation etc.: Self Employed." I turned the card over, looked along the edge, but the only other information I can add is: Bixby, Oklahoma. I don't mean to sound unappreciative, John (really, keep those cards and letters coming), but I would like to be just a bit presumptuous and ask if you wouldn't mind just a little more information. Thanks. . . **William B. Whiston** is lecturing in business administration at the Harvard Business School. Bill and Isabelle have four daughters ages 23 to 13. . . With this issue we'd like to extend our season's greetings and best wishes for the new year to all of you—**Howard L. Livingston** Secretary, 358 Emerson Rd., Lexington, Mass. 02173; Assistant Secretaries: **Marshall Alper** 1130 Coronet, Pasadena, Calif. 91107; **Walter Davis** 346 Forest Ave., Brockton, Mass. 02402; **Paul Smith** 11 Old Farm Rd; North Caldwell, N.J. 07006

## 55

Winter is upon us, but we can look back to the sunny weekend of our reunion, which provided an opportunity to renew acquaintances, count children, and notice bald spots. However, an event that took place in Amado, Arizona on September 29 is of greater significance in commemorating the life and contributions of a member of the class of 1955.

The newest astronomical instrument of the Smithsonian Observatory, a 60-inch reflecting telescope designed for stellar and planetary research, was dedicated to **Carlton W. Tillinghast, Jr.**, who served as Assistant Director for Management of the Smithsonian Observatory from 1960 to 1969. His wife Suzanne unveiled a plaque acknowledging his leadership of the research program of the Smithsonian Observatory, and his role in guiding the early development of the Mt. Hopkins facility. Carlton W. Tillinghast, Jr. died of cancer in July 1969.

An endowed professorship fund has been established at the University of Bridgeport, Conn., by **Henry B. duPont, 3rd**, who is the manager of new business development for the Remington Arms Co. He is also president of the Greater Bridgeport Symphony Orchestra, (GBSO?) and at his request, preference was given to the curriculum of music in selecting the duPont Professor. Henry

duPont lives in Southport, Conn., with his wife, Joan, and their son, Henry 4th.

This summer, **John N. Rossettos** was a visiting associate professor in the Department of Mechanical Engineering at M.I.T. . . **Arthur H. Brownlow** has received a National Science Foundation grant for a geochemical study of primary sulfide materials in a region of Montana. He is an associate professor of geology at Boston University. . . **Karl A. Reuther** was named to the board of directors of the American Bank of Commerce in Akron, Ohio. He is executive vice president and secretary of Reuther Mold and Mfg. Co. of Cuyahoga Falls. . . In the same vein, **William Friedman, Jr.** became a director of the Iowa-Des Moines National Bank this year. He is an administrative vice president and director of Younkers Brothers, Inc., with responsibility for corporate planning and research.

**Harold Wells** has been promoted to general sales manager for the microwave products group of Microwave Associates. He has been with the firm since 1962, and lives in Concord, Mass., with his wife and three children. . . **Russ Meyerand**, who is director of research at United Aircraft, has been appointed a consultant to the Army Scientific Advisory Panel. . . At the reunion this year it was good to see **Dean Zeilon**, who is a group manager for Charmin Paper Products in the unlikely town of Mehoopany, Pa. Dean and Mary have two children, and he says that the disposable diaper market is greatly expanding. I believe it, Dean. . . Attending the International Conference on Magnetism in Grenoble, France this summer were **Frederick Morgenthau** and **Eric Thompson**. Rick, Barbara, Janet, and Ann Morgenthau toured Europe, but the lack of unity probability in expected aircraft destinations prompted them to return to the U.S.A. on the Queen Elizabeth II. The Thompsons flew.

Among those items that are in the Would You Believe? category is the story of the restoration of the voice of Enrico Caruso (who was not in our class) by **Thomas Stockham, Jr.** (who is). Tom is an associate professor at the University of Utah, and he has developed a signal processing technique that removes the characteristics of the old recording equipment from a digitized version of early voice recordings. The results are reported to be very lifelike, and Tom anticipates that by adding extrapolated "highs" he can improve the sound still further. . . As this year closes, I wish you all the best of Season's Greetings. May the coming year be an exciting and important one for you, so that I can write about it in the class notes.—**Allan C. Schell**, Secretary, 19 Wedgemere Ave., Winchester, Mass. 01890

## 56

To open this month, we have a hot item from the classified ads: Wanted—Mem-

bers of M.I.T. Class of 1956. Place—Harbor View, Edgartown, Martha's Vineyard Island, Massachusetts. Date—June 4-6, 1971. Enterprising Entrepreneur: William S. Grinker, Esq., Reunion Chairman, c/o Boston Computer Group, Inc., 15 School St., Boston, Mass. 02108, telephone 617-227-8634, has reserved entire hotel to entertain the hordes of pilgrim classmates wending their way to the scene of the 15th reunion. For indoor sports there are bars, dancing facilities, swimming pool. Outdoors—beaches, docking facilities for yachts, golf, bicycles, fishing, etc. Harbor facilities, nearby airports, transportation to the ferry enable one and all to enjoy pollution-free atmosphere.

On October 16-17 the Alumni Officers Conference highlighted progress by the Hoffman Commission on M.I.T. Education—which will define the future of education at the Institute. It is important that all alumni read the report of this group and comment if you like. Familiar faces at the Conference included Charlie Joyce and wife, up from the White House; Paul Cianci from Connecticut; Ed Baker from New York; Warren and Renata Briggs, TGS, BBB, John Stelling and even the "Grink" from Boston.

We hope that all classmates read **Bob Malster's** recent letter carefully. Bob is retiring after a successful decade as President and everyone is expected to show up at the retirement dinner in Edgartown.

Last March **Ed Boggs** was promoted to vice president of Capitol Engineering Company, Dillsburg, Pa. . . In April **Dick Jacobs** was elected a principal of the firm of A. T. Kearny, management consultants based in Chicago. . . In October Lieutenant Colonel **Thomas Nelson** received the Legion of Merit from the Army. He has already received the Bronze Star, Air Medal and Army Commendation Medal. Tom is on his second tour in Vietnam. . . **Phil Spertus** was elected president of Intercraft Industries Corp., a family-run Chicago-based picture frame manufacturing company.

**Bruce Wedlock** was chosen for the Young Engineer of the Year award by the Metropolitan Chapter of the Massachusetts Society of Professional Engineers. . . Season's Greetings and see you soon in 1971.—Cosecretaries: **Bruce B. Bredehoff**, 3 Knollwood Dr., Dover, Mass. 02030; **T. Guy Spencer, Jr.**, 73 Church St., Weston, Mass. 02193

## 57

Starting off this month is a letter from **Ed Hoyt**: "Since leaving M.I.T. I've been bouncing around a bit. I never really worked as an engineer but went back to school for a Ph.D. in international economics at the Fletcher School of Law and Diplomacy, then spent a couple of years in Colombia, South America running the local office of a non-profit foundation and since 1966 (October) I've

been in the International Division of Morgan Guaranty Trust Co. I'm presently responsible for the Bank's business in half of Latin America. Maybe an odd place to end up but it's been great fun so far." . . . **John Day** has started a new company, I.P.T. Corporation (International Production Technology) which makes production equipment for the electronics industry. The firm, which now employs 90 people, was recently the subject of an article in *Electronics Magazine*. . . . **Julius Hyman** was recently made head of the propulsion research section of the ion device physics department at Hughes Research Laboratories in Malibu, Calif. Julius and his wife have two daughters.

**John Marsland** writes as follows: "My family and I have recently returned from an overseas assignment with Uniroyal—15 months in Edinburgh, Scotland and 6 months in Bromsgrove, England. My wife (the former Carol Hesse) and I have three children—two girls and a boy. My current job is section manager for Research and Development, Uniroyal Plastics Division.

**Stuart Patterson** Assistant Professor of Engineering at Swarthmore College, is on a year's sabbatical leave to the National Center for Atmospheric Research in Boulder, Colo. . . . **John Pacinda** received his J.D. degree from the University of Connecticut School of Law in June of this year. . . . Those who attended the 1970 Homecoming at Tech were **Jim Cunningham** and his wife, **Jack Currie** and **Bill Doughty**. . . . **John Fredericks** has founded a bank, the Lakeland State Bank, in New Jersey and serves as President. He is also President of Fredericks Fuel and heating Service in Oak Ridge, N.J. . . . **Dick Smith** is now Chief of the Coronary Care Unit of the Washington County Hospital. He was responsible for the initiation of this unit. . . . That's all until January. My best wishes for a Happy New Year.—**Frederick L. Morefield** Secretary, Tiirasaarentie 17, Lautasaari, Helsinki 20, Finland

# 59

Before I get started on this month's column, since this is the last issue of 1970, may I take this opportunity to wish you and yours a very happy holiday season and all the best for the New Year.

A recent press release announced the latest success of one of our most illustrious classmates. **Walt Humann** was named vice president—secretary and general counsel for L.T.V. Aerospace Co. in Dallas. He was formerly secretary and assistant treasurer and his new duties will not only involve corporate legal and secretarial duties but also general management duties. In addition to his other awards, Walt was selected, along with Pettis Norman of the Dallas Cowboys, as co-recipient of the Junior Chamber of Commerce's Distinguished Service Award for Dallas' Outstanding Young Man for 1969. . . . Speaking of awards, **Lynn Sykes** received the Macelwane

Award of the American Geophysical Union as the outstanding young geophysicist of the year. He is presently Associate Professor of Geology at Columbia University. . . . Speaking of the American Geophysical Union, **Fred Spilhaus** has been appointed executive director of this prestigious organization. Fred joined the A.G.U. staff as assistant executive director in 1967, prior to which he was employed by the federal government. He lives with his wife Sharon and three children in Fairfax, Va. (Have you noticed how nicely this column has been logically connected? Here's where it ends!)

**Will Johnson** writes that he completed surgical residency training at Boston City Hospital and is presently stationed at Chelsea Naval Hospital. His wife Elsie gave birth to son David this past September; other children are Karen, 4½ and Thomas, 2½. . . . **Lou Nelson** informs us that he is now Assistant Professor of Hemosurgery at Albany Medical College and is living with wife Julie and son H. Peter (3) in Albany, N.Y. . . . Another classmate in the medical profession is now doing his thing for Uncle Sam. **Marty King** is currently serving a two-year tour in the U.S.A.F. as staff pathologist at Wilford Hall Hospital, Lackland A.F.B. He writes that he will be out in August 1972; he feels that he has the best assignment in the Air Force for an M.D. and also that "San Antonio isn't bad."

I never cease to be amazed at the diversity of careers being pursued by our classmates. Amazing what an M.I.T. education prepares one for! . . . **Paul Buce** was awarded a master of engineering degree in engineering science from Penn State University this past September. . . . **Mike Ash** has been a staff member at M.I.T. Lincoln Laboratory for the past six years after obtaining his Ph.D. in mathematics from Princeton University. Mike and his wife Marta reside with their two children Arthur (6) and Rachel (4) in Lexington. . . . **Fred Sellers** has returned to I.B.M. in Poughkeepsie after spending an enjoyable and challenging year at M.I.T.'s Center for Advanced Engineering Study. Fred, his wife Margaret and their children Kathy, Jon and Betsy live in Hopewell Junction, N.Y. . . . **Neal Des Ruisseaux** recently left his position as Assistant Professor at the University of Cincinnati (Mechanical Engineering) to accept a position at the Engineering and Research Center of S.K.F. Industries, Inc., in King of Prussia, Pa.

It is with deep regret that I relay to you the news of the deaths of three of our classmates. **Leif Johnson** passed away on October 9, 1969, **John L. Roberts** on November 24, 1969 and **Panayotis Mallios** last Christmas Day, 1969. On behalf of the entire class, may I express our deepest sympathy to the families. . . . Remember to keep those cards and letters coming and I'll be talking to you next month. Until then, take care.—**Arthur J. Collias**, Secretary, 61 Highland Rd., Brookline, Mass. 02146

# 60

**Bob Larson** was named Outstanding Young Electrical Engineer of the United States for 1969 by Eta Kappa Nu. Bob is vice president and director of Systems Control, Inc., a division of Wolf Management Services in Palo Alto. Bob received the honor for his "outstanding wide application of modern control theory, his notable leadership and his dedication to community and church affairs."

And more glory for Course VI: **Bob Storer** has been appointed director of engineering for Interplex Corp. in Waltham. Bob was with Raytheon as senior engineer and group leader in the design and development of various computer display terminals before joining Interplex. . . . And **Edward Aron** has been elected vice president and director of research and development at Graphic Systems, Inc., in Lowell, Mass. He too was with Raytheon and Sylvania before joining his present firm. . . . **John Boatwright** is now vice president of Northeast Electronics Corp. in Concord, N.H. His wife writes that she and the four kids (2, 4, 6, and 8) are enjoying New Hampshire living. . . . **Sam Gorovitz** has been named Dean of Adelbert College at Case Western Reserve University. Sam headed a study of the school's Adelbert and Mather colleges; that commission recommended that the present structure of Mather college (for women) and Adelbert College (for men) be replaced with three theme colleges. The report has not yet been acted upon. Sam has been at Case Western Reserve since 1964 where he will continue as an associate professor of philosophy.

**Raymond Gumb** is Assistant Professor of Philosophy at Lafayette College in Easton, Pa.; he got his Ph.D. from Lehigh and was with TRW Computers Co. in Canoga Park, Calif., for seven years before going to Lafayette. . . . **George Hixson** has been promoted to advisory engineer in S-3A drum circuits development at I.B.M.'s Electronics Systems Center in Owego, N.Y. George has been with I.B.M. since 1964. . . . **Joe Goldstein** is at Lehigh University in Bethlehem, Pa., where he is Assistant Professor of Metallurgy and Materials Science. Since 1969 he has been performing research on moon samples from recent Apollo flights.

**Clyde Reedy** writes: "After a year teaching ROTC at Rose Polytechnic Institute in Terre Haute, Indiana, and another year studying Thai at the Defense Language Institute in Washington, D.C., my wife (Donna Kay (Mills) of Washington, Indiana) and I are living in Ratchaburi, Thailand. Have been here since June 1969, and will return to the States in June 1971. I'm Commanding Officer of Detachment VIII, Army Advisory Group—Thailand, and Senior Advisor (Operations and Training) to the Commanding General, Royal Thai Army Corps of Engineers, and to the Thai Army Engineer School. My wife and I are the only American family in a small (pop. 25,000) down-country Thai town, and it has been



an experience, to say the least. We've had the opportunity to visit Malaysia and Singapore, as well as most of Thailand, and trips to Nepal and Hong Kong are coming up in the next few months. Would appreciate hearing from any of my old fraternity brothers (Theta Chi), since being in the Army and the attendant frequent changes of address makes it all too easy to lose touch."

No trips to the Orient for me; I'm still commuting from Cambridge to the University of New Hampshire where I'm teaching Production and Operations Management at the Whittemore School. In January Chris will be a Visiting Associate Professor at the Wharton School in Philadelphia. Since we'll still be living in Cambridge until I finish my degree at Harvard, our commuting will really be wild for a while. Catch us if you can, and if you can't, drop a line giving your whereabouts to: **Linda G. Sprague**, Secretary, 10 Acorn St., Cambridge, Mass. 02139

## 61

Please note a new address at the end of this column. We have moved to a large Victorian structure in one corner of Brookline and are still trying to find ourselves in the chaos.

The major factotums of the class gathered here a few days ago to discuss the impending 10th reunion of the class. We recalled that there were quite a few complaints about the cost of our fifth reunion and decided that this meeting of the class should be done as cheaply as possible. From this premise evolved the suggestion that we all meet on June 4, 1971 in Cambridge (of all places). Arrangements have been made to allow families to stay in the dorms, if they wish the cheapest accommodations. In addition there will be one or two hotels or motels for those of you wanting more lavish abodes. Other plans include a dinner dance at one of the local museums and a clambake at some appropriate spot. Other ideas include a meeting with members of the class of '71 to find out what really is going on at the Institute. All of these plans are subject to modification but the basic premise of a Cambridge reunion seems to be fixed. The committee responsible for this minor break with the Cape Cod tradition consists of Jerry Grossman (the Major major factotum), John Castle, Dave Ness, Tom Hastings and Ed Sonn.

### Stop the Press. . . .

I found some mail in the mess around here and forward to you the following tid-bits: LCDR **Millard Firebaugh** and wife Barbara produced their first child: one Joshua Henry, last March. . . . In May **Frank Bachner** had his second son, William. Frank got out of the army in May 1968 and has been working in the microelectronics group at Lincoln Labs ever since. That about completes the social page. Moving on the historical record **Peter Lindquist** writes: "Since graduation from M.I.T. I have been em-

ployed by Lockheed Aircraft Corp., first as a metallurgical engineer and later as a scientist in the research labs. I attended Stanford University part-time, receiving an M.S. in materials science in 1966. In 1967 I was married to Lois De-Groff of Palo Alto. I just received a Ph.D. in material science from Stanford and am joining the solid state labs of Hewlett-Packard Co. in Palo Alto."

**Chan Coyle** has long neglected us but now repents thusly: "Having received an M.S. in industrial management at Purdue in 1962 I returned to Rochester, N.Y. and started to toil with Mixing Equipment Co. (Lightning Mixers) in their Application Engineering Department. My present title is 'Senior Engineer-Section Head-Viscous Mixing.' I was married in 1964 to the former Betty Alanpi and now have two boys (with a capital B): Chan Jr. (age 4) and Jay (age 2)—both normal, healthy and over active."

On the academic front there are still a few members of the Class pursuing advanced degrees. **Emilia Ivanoff Nordtvedt** is writing a thesis toward an M.S. in early childhood education at the Bank Street College of Education in New York. She has been teaching nursery school children since she got an M.A. in clinical psychology at Stanford in 1962.

**John Maslanka** is at Boston College working on a Doctor of Philosophy in philosophy. . . . Just out of the Groves of Academe (Sloan School branch) is **Lenny Coris**. He received an S.M. in finance last June. While hitting the books he also built up his own firm: Leonard M. Coris and Associates. L.M.C. & A. specializes in financial planning for small businesses and (rich) individuals.

In the travel section **Manuel Moreno** reports from Japan that his work for Cooper Bessimer and the country are "quite exciting and challenging." . . . **Dick Chang** is back from a "memorable" semester in Oxford, England. He says: "Our 3 children (ages 7, 4 and 3) particularly enjoyed their British school there. I have been promoted to an associate professor and am anxiously awaiting the graduation of my first two graduate students this year." . . . **Allen Armstrong** bid aloha to romantic Vietnam in 1967 and promptly went to work for the NASA Electronics Research Center in Cambridge. Well, that folded last July and Allen moved west to Waltham (Mass.) and Foster Miller Associates. The Armstrongs have had a house in Lexington since 1969 and they are now building a garage which will bring their amateur automobile fabrication center inside.

### Upward Bound

**Roy Breon** moved up at National Radio Co. of Melrose, Mass., last year. Now he is the manager of navigation systems. . . . **Jim Francis** moved up to become General Manager of the Software Division of Canberra Industries last March. The family: Celia, Christopher (3) and Sarah (1), has moved to Meriden, Conn.

**Leo Cannon** still is at Lybrand Ross Brothers and Montgomery Accountants, but has moved to New York (the big time). He is a manager in the accounting and auditing technical services division of the national headquarters. Congratulations, gentlemen!

### Final Notes

**Mike Remler** wrote that he is married to Sylvia Levinson and they have two kids: Dahlia (4) and Ilan (2) and Mike is an assistant professor of medicine at the Medical School of the University of North Carolina at Chapel Hill. . . . **Joe Harrington** spent a year on the East Coast but has returned to middle America in Chicago and his usual job at Illinois Edison. . . . Finally **Richard Naylor** was faculty resident in Burton Connor at M.I.T. Well Burton is being gutted this year (as you will see if you come to Cambridge this spring) and a Burton in Exile has been set up in Boston and Dick has moved also. . . . Merry Christmas!—**Andrew Braun**, Secretary, 464 Heath St., Chestnut Hill, Mass. 02167

## 62

Season's Greetings to one and all! From my secret sources, I have determined that **B. T. Tucker** is with Arthur D. Little, Inc. in Cambridge, Mass.; **John Costello** is with Badger, Ltd. in London; and **Donald Dible** is with Kincom International in Santa Clara, Calif. . . . **Floyd Dunn** received his Ph.D. in nuclear engineering and science from R.P.I. last August. . . . **Jerry McAfee** received a Young Engineer award from General Electric Company's Aircraft Engine Group. . . . **Jeff Steinfeld** was named an Associate Professor in Chemistry at M.I.T. in July and is a senior tutor at Senior House. **Gerald Pollon** received his B.S., M.S., and Ph.D. degrees from M.I.T.; prior to 1965 he was associated with the M.I.T. Electronic Systems Laboratory; from 1965 to 1968 he was a senior engineer and design specialist with General Dynamics Corporation in Pomona, Calif., where he was concerned with problems in radar and microwave radiometry. Since joining Technology Service Corporation in 1968, Dr. Pollon has been concerned with environmental clutter and target modeling for radar system analysis. At TSC he is presently Associate Manager of the Radar Department. He has authored papers on radar signal processing and modeling.

**Fran Berlandi** headed a seminar in New York, held for recent M.I.T. alumni. He is now associated with Isotopes in New Jersey as project director of nuclear research and has achieved a national reputation in nuclear chemistry. **Ron Benrey** is vice president and director of operations for a new firm called Industrial Evaluations, Inc. in Hauppauge, N.Y. He says his firm is the Consumer's Union for business equipment. In a 10,000-square-foot building, business equipment is tested and then reported on every two months in a hard-cover reference book; a "Trendletter" is issued

during alternate months. . . . **Donald Nelsen** has received a \$1,000 David T. Schultz award and has been promoted to the rank of associate professor of electrical engineering at M.I.T. He was cited for his leadership and teaching on electronic circuits and devices. . . . **Erich Bender** co-authored an article "Noise Generated by Subways Aboveground and in Stations" for the Office of Noise Abatement in the U.S. Department of Transportation. **Robert Gilmore** was promoted from instructor to assistant professor in the Physics Department at M.I.T. last July.

**Bill Mihalts** is with I.B.M. in White Plains in the systems planning area of program product development. He and his wife had a girl, Elizabeth Marie, in July. . . . **Gerald Gottlieb** has joined the faculty of the newly re-activated Rush Medical School in Chicago as assistant professor of bioengineering.

**David Korkosz**, who was a Ph.D. candidate in the Nuclear Physics Department at Brandeis University until early 1969, has given up the scientific world for a career as a cobbler. He is a partner in Tom Tisdale's Sandal Shop in Harvard Square. In a *Newsweek* article concerning a growing number of Americans who are walking away from their middle-class goals and professions to learn a craft and make it their vocation, he stated "Think about it—would I contribute more to the salvation of the world as a nuclear physicist than as a cobbler?" His father subsequently stated that the article oversimplified the situation—Dave actually plans to take a break and refresh himself with new ideas, but ultimately to return to nuclear research. His firm produces sandals, leather coats, skirts, trousers, and belts. During his stay at Brandeis, he worked under the guidance of Dr. Shwinger, a Nobel prize winner in physics.—**Gerald L. Katell**, Secretary, 13751 S.E. 20th Street, Bellevue, Wash. 98005

## 63

My thanks to **Phil Schneider** for forwarding the following unhappy news. Phil writes, "I regret to inform you that our good friend and classmate **Tim Sloat**, Course X, passed away on 3 January 1970. At the time Tim was employed in research at Rocketdyne and was working on his Ph.D. thesis at U.S.C. He is survived by his wife Mollie and son Brian. Tim died of leukemia."

### Classmates Overseas

**Robert Norris**, after graduating with an M.S. in industrial management, spent two years with Carroll Wilson's M.I.T. Fellows in Africa Program. Ghana and Mauritius were his stations where he concentrated on the development of banking and development planning. Following this in 1965 and 1968, he was with Lennox Industries stationed in Frankfurt, West Germany. . . . **Allan Tobin** wrote that he was a visiting scientist at the Weizmann Institute of

Science in Israel and expected to be back at M.I.T. this fall for postdoctoral work in the Biology Department. In 1968 he married the former Elaine Munsey of Louisville, Ky. while they were both graduate students at Harvard.

### Police Work

**Nelson B. Heller** writes that he completed his Ph.D. at the University of Pennsylvania in operations research. His thesis work on portional rotating schedules was carried out at the St. Louis Police Department where he is doing further work on police patrol operations.

### Complaints

**Michael Bertin** writes, "I have a few choice words for my class secretary, but they are probably not publishable." **Bob Johnson** asks, "When will we see some notes about the class of 63?" I used to complain about our class secretary and now I am one. Any and all help will be welcome. Mike, if you would like to do the next column I will mail you the material. This offer applies to any other classmate as well. . . . "The letter from Mr. Van Aken (dated March, 1970) was ambiguous. I wish to explicitly state that my support is with the students, and it is my desire that M.I.T. free itself from war research." Signed, **Gary Jensen**.

### The Ph.D.s' are still coming

**Roger Hinrichs** completed his in nuclear physics at the University of Washington in September of 1969 and is now at the Michigan State Cyclotron Laboratory. Roger is also the proud father of a son, Keith, born March 12, 1970. . . . **Joseph Goldfarb** and his wife Toni are enjoying their daughter Lisa Ann and the happiness that follows the end of graduate school. He received a Ph.D. in pharmacology and was headed for an instructorship at the Albert Einstein College of Medicine. . . . **George Lukas** completed his Ph.D. in organic chemistry and spent a year doing postdoctoral work in France. He is now doing drug metabolism work at the Geigy Chemical Corporation in Ardsley, N.Y. . . . **Allen Tunick** is with the Allied Chemical Company's central research laboratory after receiving his Ph.D. at the University of California at Berkeley. . . . **Gerald Cooperstein** received his Ph.D. in physics from M.I.T. in 1968 and is presently employed as a physicist at Ion Physics Corp. in Burlington, Mass. . . . **Frank Fradin** was awarded a Ph.D. by the University of Illinois, Urbana and is now a research metallurgist at Argonne National Laboratory as well as a visiting Professor of Physics at Northern Illinois University.

### Academia

**Elliot Koffman** is teaching at the University of Connecticut where he holds an assistant professorship in the Electrical Engineering Department. He and his wife Caryn have three children: Richie, 5, Debbie, 3, and Robin, 9 months. He adds, "We are happy to be in New England again at long last." . . . **Philip Graham** was taking his doctoral examination at R.P.I. and then transferring to

George Washington (in D.C.) to continue working toward his doctorate under Dr. Joseph V. Foa who was leaving R.P.I. . . . **Anthony Dralle** wrote that he was 99% finished with his Ph.D. thesis at Carnegie-Mellon University and has been working for Westinghouse at Beltis Atomic Power Laboratory. He has been married for over three years and was expecting a first child. . . . **David Kelly** was married last May and is currently in the Ph.D. program at Columbia studying for a degree in production.

### Author

**Richard Durst** published his first book, *Ion-Selective Electrodes*. He is with the National Bureau of Standards in the Electrochemical Analysis Section.

### Business and Industry

**William Gessiman** is in management at Peat, Mariwick, and Mitchell's Transportation Research Group. He writes, "I went to work (after SM'65) for a small transportation consulting firm because I wanted a small group. Now we have been bought out twice by successively larger companies and we now work for the world's largest accounting firm! **Ned Brush**, **Chip Goldblum** are other '63ers here. Chip is on an around-the-world trip." . . . **Edgar Rust** is employed by Building Systems Development Inc., San Francisco, in urban planning management. . . . **Stephen Piner** is in technical management at Canberra System Software Corporation, Meriden, Conn. . . . **Tom Lewis** is a programmer at the Prudential Insurance Company in Newark and is engaged to be married to Miss Margaret King originally of Glasgow, Scotland. Margaret has been in the U.S. for five years and is employed as an accountant in Manhattan. . . . My warmest greetings for the holiday season.—**Martin Schrage**, Secretary, 305 Massachusetts Ave., Arlington, Mass. 02174

## 64

There are no Class Heroes this month, and without a last minute infusion of clippings from the *Review* office this column would have been barren. The MORAL: Write or wither without news!

**Pete Angevine** has returned from Bombay, India with a native bride he met at his office over yonder. They are living in Ridgefield, Conn., where Pete is a chemical engineer for Dorr Oliver in Stamford.

**Anthony England**, a NASA astronaut, addressed the students at the University of Missouri this spring on the subject of "Science Returns from Apollo 11 and 12." He is currently a doctoral candidate at M.I.T. . . . **Ronald Frashure** received his M.B.A. from Harvard Business School this June. . . . **Jonathan Gross** is presently an assistant professor of mathematical statistics at Columbia. . . . **John Hanson** was recently selected as one of 17 young men and women from more than 1,000 candidates to serve one year in residency in Washington as a



White House Fellow. White House Fellows serve as special assistants to Cabinet Officers and senior members of the White House staff. John will take a leave of absence as a senior scientist at Westinghouse's Bettis Atomic Power Laboratory near Pittsburgh. He and his wife Stephanie have a two-year-old daughter. . . . **Antony Heatwole** has moved from New Jersey to Bethesda, Md., where he is working for the International Computing Co. designing computer systems for small business. . . . **Joe Hollweg** and his wife Karen have returned to Pasadena after two years at the Max Planck Institute in Munich. Joe is now a Research Fellow at Caltech and Karen teaches high school biology in Monrovia. . . . **Robert Hopkins** is teaching high school biology and chemistry in South Windsor, Conn. . . . **Leon Kaatz** and his family have rented a farm outside of Washington, D.C., which they are sharing with another couple. Leon's first child, Noah Kenneth, was born this May. . . . **Joe Kasper** is working on radio navigation systems at the Analytic Sciences Corp. in Reading, Mass. His daughter Jennifer Lee was born on January 22, 1970. . . . **John Ludutsky**, former national accounts manager for Industrial Nucleonics Corp. in the New York region, has been promoted to manager of rubber and plastics industries for IN's Industrial Systems Division.

**Jose Maranhao** is a partner in a firm dealing with ship, ports, and fishing planning. . . . **Leonard Parsons** is an associate professor of marketing at Claremont Graduate School. Len is also on the editorial board of the *Journal of Marketing Research*. . . . **A. N. Press** recently received his Ph.D. in psychology from Clark University, and is now an assistant professor of psychology at Kansas State University. . . . **Lawrence Rabiner** is a supervisor in the acoustics research group at Bell Labs in Murray Hill, N.J. He and his wife have moved into a house in Berkeley Heights and are expecting their first child in February. . . . **Shang Tah Shih** received his Ph.D. from the Harvard Graduate School of Arts and Sciences this June. . . . **Donald Siefkes**, currently in Charlotte, N.C., is being transferred to San Francisco by Rohm and Haas Co. Don will be their technical sales representative in that area. . . . **Joshua Singer** graduated with his Ph.D. this June from the Harvard Graduate School of Arts and Sciences. . . . **Donald Stewart** is the proud father of Douglas Russell, born May 27. . . . **Gary Walpert** received his Ph.D. in electrical engineering at M.I.T. this June. After a European vacation this summer, he and his wife Ellen have returned to work in Boston. . . . No further news; no further clippings. Remember: write or wither! and have a happy holiday season!—**Ron Gilman**, Secretary, 5209 Peg Lane, Memphis, Tenn. 38107

# 65

It is with great regret that I must announce the death of another classmate—

**Howard Turkington** died on June 29, after a long illness. He had been working on his Ph.D. in mathematics at Berkeley.

A memorial fund has been set up for G. K. Shook who died in 1968. Anyone wishing to donate to this fund should indicate this on his contribution. . . . Also let me remind you of the Julie Fasset memorial fund to which the Class of '65 made a significant contribution about five years ago; many of us have earmarked our annual alumni fund contributions for this purpose ever since. Questions concerning this fund or the memorial garden it supports should be addressed to Ken Browning at M.I.T.

Lieutenant **Andrew Slobodnick** has won the U.S.A.F. Research and Development award for his research leading to the development of a movable laser probe for increasing microwave acoustic surface propagation loss. . . . **David Barber** and **Harry Vickers** have been appointed vice presidents of Entrex, Inc.; the firm manufactures electronic data processing equipment which improves communications between computers and their human users. . . . **Bill Murphy** has been elected an Afro-America Co. director. . . . **Pat Winston** and **Paul Hoff** have been appointed assistant professors in M.I.T.'s E.E. department.

Several people completed their graduate work last spring. **Al Tervalon** has received his master's in science management from R.P.I. . . . **Charles Rall** has completed his Sc.D. and is now with Bellcomm, Inc. The Ralls report the birth of a son, Charles Abbott, in February, 1969.

**Bob Menzies** is now at the Jet Propulsion Lab after finishing his Ph.D. in physics at Caltech. . . . **Mike Oliver** is at the Lincoln Laboratory having completed his Ph.D. in E.E. at M.I.T. . . . **John Curran** has received his Ph.D. in mathematics from the University of Chicago, and has been appointed Assistant professor at Chicago's Roosevelt University.

**John Murray** finished his physics doctorate in laser research at M.I.T. and is presently on active duty as a first lieutenant at the U.S. Army Base in Huntsville, Ala. . . . **Don Smith** is now a research physicist at Perkin-Elmer after completing his Ph.D. in chemical engineering at Berkeley. The Smiths had their first child, Laura Nicole, last December.

**Bob Baird** reports the birth of a daughter Julie Catherine last September. Bob just has received his M.S. from the Northeastern evening program.

The Class of 1965 was presented at Homecoming by the Dick Minnicks, the Cassius Peacocks, Mrs. Sharon Ross and by Bob Woodall. . . . This is the last issue you'll receive prior to the holidays—so best wishes to all for a happy and successful new year.—**Jim Wolf**, Acting Secretary, Brigham Rd., Gates Mills, Ohio 44040; **Steve Lipner**, Secretary, MITRE Corp., P.O. Box 208, Bedford, Mass. 01730

# 66

Leading off our column this month are the new degree winners. **Sam Wagstaff** got a Ph.D. in mathematics from Cornell University in September and is now an instructor in mathematics at the University of Rochester. . . . **Paul Godfrey** received his M.D. in June and is presently interning at Presbyterian-St. Luke's Hospital in Chicago. . . . **Alan Dinner** was awarded his doctorate in chemistry at the University of Indiana in June. He will stay there to do postdoctoral research on chemistry and pharmacology. . . . **Rodger Thompson** completed all the requirements for a physics doctorate in August. His thesis was an infrared study of late carbon stars. He and his wife Jennifer, Simmons '66, are moving to Tucson, Ariz., where he will be an assistant professor in the Department of Optical Science at the University of Arizona. . . . In June Harvard graduated the following four: **Ken Ault** and **Charles Davis** with M.D.'s from the Medical School; and **Victor Fung** and **Monty Slatkin** with Ph.D.'s from the Graduate School of Arts and Sciences.

Next on the list are those still plugging away at a degree. **Mike Kraus** began a Ph.D. program in meteorology at McGill University in Montreal this September.

**Jim Carroll** is working on his Ph.D. in aeronautics and astronautics at Stanford and hopes to finish by December. . . . **Roger Rasmussen** is still working on his Ph.D. in behavioral science at U.C.L.A. . . . **Sandy Sawchuk** is completing a Ph.D. at Stanford in electrical engineering, concentrating on optical image processing. . . . **Richard Millman** is now an assistant professor of mathematics at Ithaca College and will receive his Ph.D. in differential geometry from Cornell in June, 1971. Since leaving M.I.T. he has produced "two papers, most of a thesis, and another (boy) child." . . . **Gerry Lichtenberger** has been at Yale working for a Ph.D. in communication theory since leaving M.I.T. in 1967 with an M.S.E.E. He expects to receive the degree in June 1971. Others at Yale include **Pete Catto**, **Marty Krone** (Assistant Professor), **Don Deangelis**, and **Dave Nicholson**. . . . **Bill Schnicke** received his Masters in electrical engineering from the University of Pennsylvania in 1969 and currently is near a Ph.D. in systems engineering and operations research, also at Penn. In addition, he is employed full time at Ketrin, Inc., in Mauvern, Pa., a firm dealing in systems analysis, operations research and computer technology. Bill now has three daughters: Monica, 4; Ursula, 3; and Erika, 2. . . . **Charles Neulander** recently coauthored a paper for the National Air Pollution Control Administration on a sulphur dioxide separation technique. He is employed at the General Electric Research and Development Center in Schenectady, N.Y.

**Jim Jackson**, has written a paper for ARPA about design coordination for the building industry.

It was a girl! Janet and **Larry King** gave birth to Jenny Elisabeth on June 9. Larry was made captain in the air force in May, so the Kings are rather busy. . . . **Peter Young** and his wife have adopted a mixed-race baby boy, John, born March 9. His brother Paul is now two years old. . . . **Tom Gomersal** writes that the latest addition to his family was a daughter, Amy Elizabeth, born on May 14. In September, Tom separated from the air force after four years and five days of active duty. He is now here at Colorado State University working towards an M.S. and Ph.D. in statistics. . . . Other newcomers to Fort Collins, besides us, are Mary and **Tom B. Jones**; he is an assistant professor of electrical engineering. . . . New to the married game is **Gary Platt** who took Elaine Theroux of Branford, Conn., as a bride. Gary is an engineer with Raymond International Inc., in New York

**Parker Marean, 3d**, sent a change of address (one of hundreds!) and a short complimentary note about the monthly column. . . . **Richard Nelson**, now a first lieutenant in the U.S. Army, is stationed in Fairbanks, Alaska. He writes, "Alaska is unbelievably beautiful with its mountains, multi-hued tundra and abundant game and fish. Atmospheric pollution in the lower 48 is extremely noticeable after living up here for a while; on a cloudless day one can see Mt. McKinley from Fairbanks, a distance of 160 miles."

**Bari Skinner** lives in San Jose where her husband Court, '62, is senior research scientist for American Microsystems, Inc. They have three children: Heidi, 3; Nicole, 2; and Loren Courtland Skinner, 3d, born July 17. . . . **Bob Poole**, **Jim Weigl** and several others have "acquired ownership of *Reason Magazine*, a libertarian monthly on current events. We are embarking on a major campaign to increase circulation and attract advertisers. We hope to do for the libertarian philosophy what *Ramparts* has done for the New Left." Bob is still a full timer at General Research in Santa Barbara. . . . Emily and **Richard Levine** along with their two-year-old daughter Julia Ann are now settled in Wheaton, Md. Richard continues in the Department of Health, Education, and Welfare, where he is presently a special assistant to the Deputy Undersecretary.

**Martin Melnick** has just returned from six months in the Australian bushland (Alice Springs) doing systems engineering on a tracking station for TRW Systems. He returned home via Johannesburg, Jerusalem and Paris. . . . For the last year **Jerry Madea** has been "testing his entrepreneurial fiber by bringing the computer and M.I.T. analytical power to bear on the complex field of personal financial and estate planning." With severe demands on his time he resigned from Control Data last May to work full time for his company, Alta Data Corp., as vice president and chief analyst. . . . **Bill Hoffman** is a consultant in the management advisory services department

of the Price Waterhouse firm in Atlanta. In February he delivered an address to the National Association of Accountants on the future of automatic data processing.

Class Hero of the Month is **Guy Frindell** who was the first to send a letter (through his wife, Beth, as many others do) to me at Fort Collins. He received first an M.S. in electrical engineering from Johns Hopkins in June and then a promotion with the Naval Ordnance Lab in Silver Spring, Md., where he co-oped since leaving M.I.T. Recently he shifted from circuit designer to mine reliability expert which gave him a chance to take a "fabulous" two-week cram course in safety at the University of Southern California. His new promotion gives Beth a chance to retire from teaching speech, drama and English in Montgomery County schools. She'll now keep busy with their brand-new home in Columbia, Md.

Have a very pleasant and safe Holiday Season, and let me hear from you real soon. Cheers, **Terry J. Vander Werff**, 2049 Manchester Dr., Fort Collins, Colo. 80521

## 67

I've returned to Stanford, having just completed a week-long auto trip from my home in North Dakota. I took my time getting here. I went through Yellowstone and Crater Lake National Parks, and I visited a few friends along the way. Having been softened by the easy life of the past few months I don't know how I will be able to handle business school. Please note my new address at the end of the column. I'm sharing a house with four others in Palo Alto. My room looks pretty bleak, the only piece of furniture being an old mattress upon which I'm sitting. Stop by if you are in the neighborhood; by the time this column appears in print I might even have a chair for you to sit on.

In the letter department we have an invitation to communicate with **Spence Sherman**. Spence is currently completing his Ph.D. in psychology at Stanford. He would like to hear from his old friends in the following way: on January 9, 1971, at 5:00 PST, he will be hypnotized and open. He would like very much to hear from you then. . . . **Bob Rosenberger** writes: "I just returned from my honeymoon to find the most recent issue of *Technology Review* on my desk. I note that Jeff Schoenwald has reported that I am engaged 'to whom I cannot recall.' To set the record straight, I was married on August 8, 1970, to the former Miss Stephanie Cahill of Cincinnati. We spent our honeymoon in Cozumel, Mexico, basking in the clear unpolluted air of Mexico and swimming, snorkeling, and scuba diving in the fantastically clear waters of the Caribbean. I have great memories, a fading tan, and a slight case of the 'turistas' to remind me of my honeymoon. I am still working as a proc-

ess development engineer in the International Division of Procter & Gamble. I find the work interesting because of the wide range of work I am constantly engaged in and in the people-to-people contact. My wife Stephanie is a psychiatric registered nurse, which is probably why she understands me so well. Jeff Schoenwald was supposed to be an usher at my wedding, but a most pressing publication deadline prevented it. **Paul Goldstein** did manage to make it and was an usher. He is engaged to Miss Ilene Rubinstein of Skokie, Ill., with a wedding scheduled around the first of the year. By the way, I am trying to reactivate the moribund M.I.T. Alumni Club of Cincinnati. I will simply say that I have hopes, but it isn't going to be easy."

**Ted Tenny** reports that in June he received his M.S. in aeronautics and astronautics from Stanford and that he is going back for more. While going to school he's been working as a thermodynamicist for Lockheed and getting paid to be a computer hacker. Naturally, Ted has been enjoying the climate and all the good things around San Francisco.

**Arnold Lieberman** who enrolled with the Class of 1967 but graduated in 1970, is working at M.I.T. Information Processing Center as a programmer. . . . **Gary Englander** has finished two years of factory training in the numerical control department of General Electric. He's now working in Cleveland. . . . **Kenneth Finn** has received his M.S. from Sloan and is working for General Foods in White Plains, N.Y. . . . In June **John Gowdy** married Linda Schramm of Centuria, Mo. He is still in electrical engineering at the University of Missouri. . . . **Bill Glock** is living on Long Island and working for Sperry Systems Management in Syosset, N.Y. Bill is engaged in the design and operation of navigation systems. . . . **Alan Perelson** and his wife Janet are back at Berkeley after a nine-month stay in Israel. Alan is continuing his research, and Janet is studying psychology.

**John Ribel** is in the army at William Beaumont General Hospital in El Paso, Texas. He started a "free clinic," although the town is conservative. John writes that he is involved in the "head" and chicano communities and that he has been classed a radical by the army. As a result he was taken out of social work. He still has the "magic bus" and finds time to do a lot of traveling and camping. . . . **Nathan Teichholtz** has a house in Acton, Mass., and is working at Digital Equipment. He has a son, Colin Hugh, born April 8, 1970, and an English sheep dog, Geoffrey. . . . On June 21, 1969, **Jeff Shapiro** married the former Miss Ellen Kirschenbaum of New York City. In February he received his Ph.D. in electrical engineering from M.I.T. Jeff is presently Assistant Professor of Engineering at Case Western Reserve University in Cleveland.

**Doug Benson** is living in Ridgefield, Conn., with his wife Marylyn and their



two daughters, Jessica, and Vanessa. He is still working for Learning Resources, Inc. as assistant to the president. . . . **Bob Trunek** moved to New York after his release from naval duty. He is working as production manager for Playground Corporation in Queens. In his spare time he makes wine in his basement and flies. . . . **Richard Solomon** having received his master of environmental design from Yale in 1969, is Assistant Professor of Architecture at the University of Kansas. He married Nancy Kramer of New York City on January 11, 1970. . . . **Bob Sitrin** is working toward a Ph.D. in chemistry at Harvard. He married the former Miriam Brand in October, 1969, and they are living in Somerville, Mass. . . . **Howard Evans** writes that he is continuing to serve the country in the United States Air Force. He is a first lieutenant training as an F-4 navigator.

**Joseph Levangie** is with the Avco Systems Division in Wilmington, Mass. . . . **Jim Sutton** is studying for his doctorate in business at Stanford. He had been working for Memorex in Santa Clara. . . . **Ron Oslen** is at Bell Labs in Holmdel, N.J. He married Maureen O'Brien in Nutley, N.J., on August 16, 1969. . . . **Richard Munkelwitz** has moved to Evanston and taken a new position with Amoco International Oil Co. of Chicago.

At the end of May, **Gerald Lisowski** rode his motorcycle to Toronto to catch the Grand Prix of Canada motorcycle races. On his way back to Madison he stopped off in Chicago where he met **Steve Powell** who had flown in from L.A. After spending a few days and many dollars there, Steve flew on to New York and Gerald returned to Madison where he's pursuing a Ph.D. . . . **Eric Johnson** has taken a position as associate planning engineer with Kennecott Copper Corp. in Salt Lake City. For three years he has been with Casting Laboratory of Chase Brass & Copper, a Kennecott subsidiary.—**Jim Swanson**, 774 Channing, Palo Alto, Calif. 94301

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Greetings again from high above the Charles River here in scenic Cambridge. Gail and I wish everyone a Happy Chanukah and a Merry Christmas. We hope that the coming year will be a peaceful one for everybody.

Last year the class was listed as having 851 members, this year we have 895 members. There could be many possible explanations for this growth, but I feel that it is mainly caused by people getting their class listing straight as we have urged in the past. Thanks! Gail and I attended the Alumni Officers' Conference in October and I was on a panel which discussed research and graduate study. My proposals to change the election procedure for members of the M.I.T. Corporation stimulated much discussion at a hearing of the Constitution and By-Law Committee during the conference. I am confident that by next year there will be



Gordon Logan, '68

some major changes in the procedures. So much for the announcements, so let's get on with the news.

### Recent Additions

The first baby born to a coed in our class is Theresa Joanne Silver who arrived on July 3, 1970. The proud parents are Len ('66) and **Louise (Lentin) Silver**. Louise had been tutoring in the South End prior to the birth and Len is working at the Draper Lab. . . . **Liz and Don Batchelor's** daughter Betsy (Mary Elizabeth) was born on March 30, 1970. Liz writes that Don is working for Sanders Associates, going to the University of Maryland, and "is very busy."

### Nuptial Notes

We have two December weddings to announce. **Pat Pollock** is going to marry Phillip Farrington on December 26 in the M.I.T. Chapel. Phil graduated from Catholic University in 1964, received a Master's from Boston State and Columbia, and teaches math in Dedham. Pat is working at the Draper Lab. . . . **Steve Finn** will wed Renee Franzblau whom he met way back in our freshman year. Renee comes from New Jersey.

**Brooks Hilliard** was wed to the former Judi Landesman (BU '70) on July 19, 1970. Brooks attended Harvard "B" School for a year and then joined the Coast Guard to avoid the draft. He's now stationed at U.S.C.G. Headquarters in Washington, D.C.

### Selective Service Stories

Sp/4 **Carl Martland** is putting his M.I.T. education to good use as a stockade guard at Ft. Devens. He turned down a direct commission to Second Lieutenant because of "implied complicity in and agreement with Vietnam, and military pay-life-manpower-justice." He's getting out on January 29 to come back to M.I.T. in Urban Systems. . . . **Jay Sinnett** has completed a year of duty with the Naval Electronic Systems Com-

mand Headquarters in Washington, D.C. In July the command moved out of the "temporary" Main Navy Building (vintage WWI) and into beautiful new offices in Arlington. . . . **Paul Forbes** is an Ensign in the Navy's Civil Engineer Corps and is currently assigned to U.S. Naval Mobile Construction Battalion 10-1 of the Pacific Seabee Battalions. He returned from Vietnam in September, but expects to go overseas again in February. . . . **Gordan Logan** has graduated from Air Force Pilot training and has been stationed at Clark AFB, Philippines. He is with the 774th Tactical Airlift Squadron. . . . The Class of '67 column last month had a short note from **Lynn (Wiesenberger) Bruneau** which you might have missed. She reports that her husband Bob ('67) was wounded in Vietnam in November 1969 and returned to Valley Forge Hospital in January. I assume he is all right now as she writes that he was transferred to Fort Riley, Kansas as a clerk. Bob hopes to get out early and resume work on his Ph.D. which was suddenly interrupted. Lynn is still working as a programmer at Penn State.

### Perpetual Students

We received a nice note from **Ric Klass** which I unfortunately misplaced and found recently. Ric and **Gary Anderson** both received M.S.'s in aerospace engineering from the University of Southern California. Until September Gary had been working at North American Rockwell and Ric with Northrop Electronics in L.A. But Cambridge has some mystical attraction which even California can't beat. They're both back here at Harvard "B" School now and reportedly have good lottery numbers. Ric has passed on the following items: **Jeff Tranen** received his engineer's degree in electrical engineering from the 'tute in June and is now working for New England Electric. **Ken Rosenberg** is in his second year at Penn Law School. And **Howie Friedberg** is alive and well in India, gainfully employed as a guru according to rumors.

In June Harvard awarded Ph.D.'s (!) from the Graduate School of Arts and Sciences to **Richard Boyatzis** and **Claudio Oddone** and M.B.A.'s to **Richard Bard**, **Nirmal Gupta**, **Arno Haberkorn**, and **James Hossack**. . . . **Bob Kovsky** sent me a copy of a letter he sent to Dr. Killian protesting the procedures being used for the selection of M.I.T.'s next president. (His main point was that the members of the Committee on the Presidency appeared to be representatives only of the Military Industrial Complex.) Bob added that he is now doing research at Berkeley in non-crystalline electronic effects, has gone native (Berkeley style), and is enjoying himself immensely. He's sharing a house with **John Jaros** and **Jeff Stokes**, who is their political activist.

**Ben Cox** has been elected vice president of the Harvard Law School Voluntary Defenders. He will be in charge of research and appeals for the group, which was established in 1949 for stu-

dents primarily interested in criminal law. Under supervision of members of the bar, Defenders interview the defendants awaiting trial in District Courts, investigate the law and facts of the cases, and represent between five and ten defendants in court each week. . . . **Dave Ellis** is finishing his last year at Harvard Law School. He reports meeting many M.I.T. alumni there including one of his professors. He spent the summer clerking for a St. Louis law firm, learning a lot in the process. He reports that **Dave Pack** is working for Lockheed in L.A. as an aeronautical engineer. . . . **Bob Metcalfe** reports having a busy time. He received an M.S. in applied math from Harvard and is now working on a Ph.D. thesis there. He's still hacking at Project MAC. Finally he reports that his second consulting company has folded ("chalk it up to experience.") **Ken Morse** is at Harvard "B" School after having spent a year in Asia, Africa, and Europe as a director of AIESEC. . . . **Mike Krashinsky** is a second year graduate student at Yale in economics, having successfully passed two written comprehensive exams. He expects to finish course work and comprehensives this year and begin thesis and teaching next year. Mike is a graduate affiliate of an undergraduate college this year and writes that he is actually beginning to enjoy New Haven.

**Jim Lewis** is working on genetic regulation in bacteria in the B. N. Ames Lab at Berkeley. He writes that he's "soaking up the golden state of California."

#### Salaried Ex-Students

**Razel (Wittels) Kaliberg** is teaching chemistry at Traip Academy in Kittery, Maine while **Keith** is stationed at nearby Portsmouth Navy Yard. . . . **Richard Fox** is working for Westinghouse Computer and Instrumentation Division as a Systems Engineer. This involves the application of computers to the automation of large industrial plants. He is living in Pittsburgh but will get to go to France this year. This past president of the M.I.T. Model Rocket Society still spends much time flying instrumented model rockets, writing technical articles about them, and organizing a club in Pittsburgh. . . . **Ken Thompson** is President and Chairman of the Board of the Genesys Corporation in Boston. . . . **Charlotte Babicki** was laid off the Apollo program at the Draper Lab and now works for PHI Computer Services in Arlington. She has also been active in Mayor White's gubernatorial campaign.

Previously I reported the death of **Marc Seelenfreund** in December 1968. You might remember that Marc became the 100th heart donor. The publicity surrounding this heart transplant resulted in a large number of contributions to a scholarship fund established in his home town of Fair Lawn, N.J. Marc's family asked his friends how this money might be best used to "help perpetuate Marc's dream of a better world for all." As a result, the funds that had accumulated were the first donation to the Institute Fund for Special Financial Need which

will be used for special financial assistance to blacks and other disadvantaged students. This gift makes a very fitting memorial. . . . See you next month.—**Gail and Mike Marcus**, Secretaries, Eastgate Apt. 16A, 60 Wadsworth St., Cambridge, Mass. 02142

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Season's Greetings from the last page of *Technology Review*. I hope that all of my classmates have had a good year and that next year will prove to be even better. Keep me and your classmates posted on your activities by dropping me a line when you get the opportunity.

**John W. Wall** entered his second year at Stanford Law School in September but will be absent next semester while completing five months of training as a medic in the National Guard. At Stanford he has been active as a legal advisor to the anti-radical Free Campus Movement, a coalition of libertarians and other conservatives. The F.C.M. has been successful in combatting radical terrorism at Stanford and has filed a \$1.05 million lawsuit against the University for its failure to protect a group of F.C.M. photographers who were allegedly assaulted by a mob of radicals. The result of this suit could have a profound effect on the policies of college administrations throughout the country. John adds that the only general comment that he can make about California is "every part of the state is overpopulated. My next stop will probably be New Mexico."

**Stephen G. Dennis** participated with three other graduate students in the most comprehensive test yet of a space station life support system. In a press statement, Dennis said his reason for volunteering for the 90-day space station simulation test which commenced on June 13 was based on his interest in the nation's space program and his desire to make effective personal contributions to it. The prime objective of the experiment was to test the effectiveness of the regenerative life support system in providing crewmen with drinkable water from reclaimed perspiration and urine and contaminant-free oxygen from carbon dioxide. McDonnell Douglas conducted the test under a contract managed by the NASA Langley Research Center in Hampton, Va.

Among marital notes I have the following. . . . **John Nicholas Drobak** exchanged marital vows with the former Miss Mary Elizabeth Nolan, who attended the University of Massachusetts in Boston. John is currently enrolled at Stanford Law School. . . . **Jim Yankaskas** married the former Miss Bonnie Cravets, a 1967 graduate of Simmons, on March 22. After a skiing honeymoon in Colorado, Jim resumed work at Sikorsky Aircraft while pursuing a master's degree in human factors at N.Y.U. . . . **Theodore R. Lundquist** and the former Miss Judy R. Larson of Denver are currently living

in Maryland after their wedding on August 22.

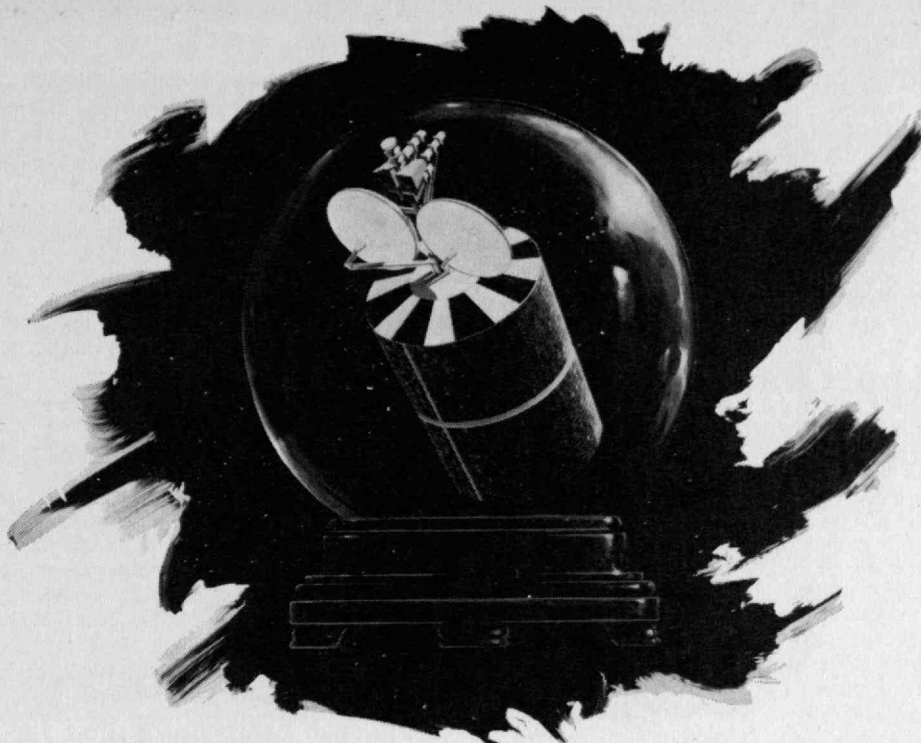
**Mark I. Ostler** is in his second year of graduate school in the macromolecular science division of Case Western Reserve University in Cleveland, working for an M.S. and later for a Ph.D. Mark adds that he has been in contact with several other classmates. **Dick Partridge** hopes to receive his M.S. in computers at the University of Illinois in January; **Bill Luken** is working for his Ph.D. in chemistry at Yale; and **Wayne Oehrli** is holding down an aero job at Westinghouse in Baltimore. . . . **William J. Greenberg** has started his second year at the Kennedy school of government at Harvard working on his Ph.D. in the public policy program. . . . **Richard G. Marcus** will graduate from M.I.T. Sloan School with an M.S. in industrial management in January 1971. . . . **C. Jack Corgan** is an assistant professor of architecture at the Oklahoma State University. . . . **Hans W. Polzer** is a full time teaching assistant in physics at Rutgers University while working towards his master's degree.

**Mark Arvid Wuonola** graduated from Harvard with a Ph.D. in the graduate school of arts and sciences.

Classmates receiving graduate degrees in June 1970 included the following:

**Donald E. Uhl** completed his master's degree in nuclear engineering at Stanford. He is now doing nuclear engineering at Combustion Engineering, Inc. in Hartford, Conn., while working towards an M.B.A. . . . Miss **Bonnie M. King** completed another year at the 'tute to get an M.S. in flavor chemistry while holding the position of resident chemistry tutor in McCormick Hall. She is currently employed by Firmenich and Cie in Geneva, Switzerland. . . . **Jeffrey M. Weissman** received his master of arts in teaching from Harvard. Jeff is now teaching science and English at Brookline High School and also coaches soccer and baseball. . . . **Michael Jacob Epstein** is a graduate student and teaching assistant at Ohio State University. . . . **Robert A. Schaeffer** is still working at the Education Research Center at M.I.T. as an instructor in the unified science studies program. Bob reports that he is keeping active politically as area director of the movement for a new Congress. . . . **John Alden Gage, Jr.**, is working as an aeronautical engineer on the trajectories of Navy projectiles. He is living in Fredericksburg, Va., where he keeps active playing tennis and skiing. . . . **John R. Smith** is working for Hughes Aircraft in Fullerton, Calif., and attending U.S.C. part time in pursuit of his master's in electrical engineering. John invites any of his friends to drop by for a visit. His address is 365 W. Wilson, Apt. 36, Costa Mesa, Calif.—**Richard J. Moen**, Secretary-Treasurer, 412 Hastings Hall, Cambridge, Mass. 02138





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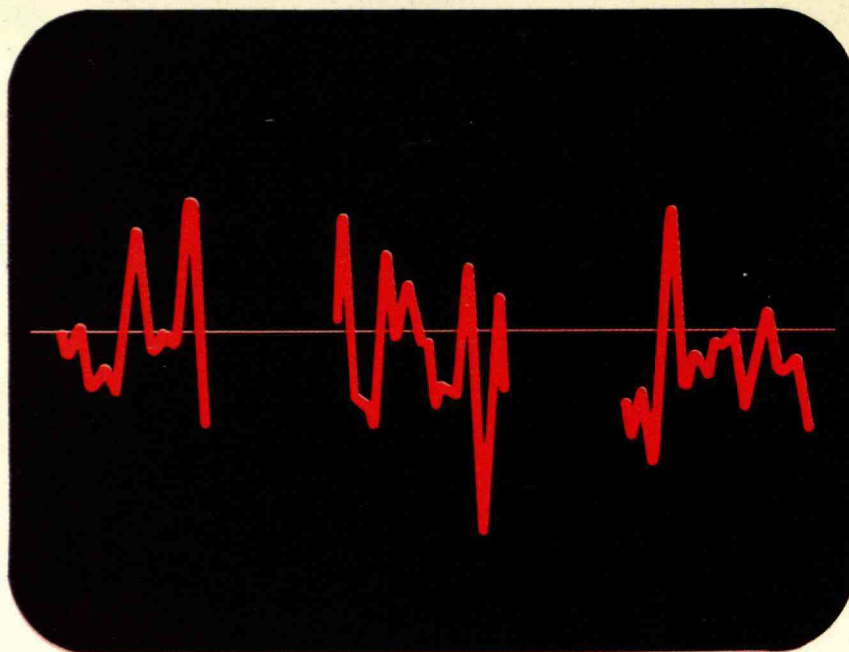
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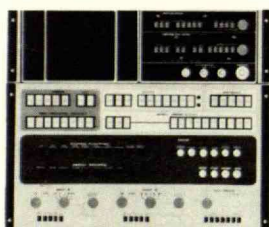
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